George A. Spencer.

INTERNATIONAL CLINICS

A QUARTERLY

OF

CLINICAL LECTURES AND ESPECIALLY
PREPARED ARTICLES

ON

MEDICINE, NEUROLOGY, SURGERY, THERAPEUTICS, OB-
STETRICS, PÆDIATRICS, PATHOLOGY, DERMATOLOGY,
DISEASES OF THE EYE, EAR, NOSE, AND THROAT,
AND OTHER TOPICS OF INTEREST TO
STUDENTS AND PRACTITIONERS

BY LEADING MEMBERS OF THE MEDICAL PROFESSION
THROUGHOUT THE WORLD

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NOTES ON NEW REMEDIES.

BY A. A. STEVENS, M.D.,

Lecturer on Physical Diagnosis in the University of Pennsylvania; Physician to the Episcopal and St. Agnes's Hospitals, Philadelphia.

NEW TANNIN COMPOUNDS.

In the last few years several attempts have been made to enhance the therapeutic value of tannic acid by converting it into compounds which will pass through the stomach unchanged and be decomposed in the intestines, liberating tannic acid. Attempts have also been made to increase the efficiency of the compound still further by incorporating with the astringent some antiseptic principle. It should be remembered that astringents themselves may act beneficially in catarrhal states of the bowel not only by lessening secretion, but also by retarding the absorption of toxins, and by coagulating albuminous substances, thus rendering the medium less favorable to the development of bacteria. The most important of these new compounds are tannalbin, tanningen, and tannoform.

Tannalbin was one of the first compounds of tannic acid to be introduced. It is a light-brown, odorless and tasteless powder, containing about fifty per cent of tannin. It is prepared by subjecting tannin albuminate to dry heat for a considerable time. It is not affected by the acids of the stomach, but in the presence of the alkaline secretions of the intestines the tannin is liberated. Moncorvo[1] has been perhaps the strongest advocate of this remedy in catarrhal affections of the bowel. He concludes, from a study of its effects in more than two hundred cases of diarrhœa in infants, that it is a most excellent acquisition to treatment. Waedemon,[2]

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[1] Merck's Archives, February, 1899.
[2] Annales de la Soc. de Méd. de Gand., vol. lxxvii.

Cozzolino,[1] and Porter[2] have also spoken favorably of it. On the other hand, Friedgring[3] declares that it has no bactericidal properties and that it does not affect the absorption of toxins. The dose of tannalbin for a child under one year is from four to eight grains, suspended in some mucilaginous vehicle. For older children the dose is from eight to fifteen grains three or four times a day, and for adults from fifteen to twenty grains, preferably in cachets.

Tanningen is an acetic ester of tannic acid, and appears as a yellowish, odorless, almost tasteless, hygroscopic powder, insoluble in water and acid solutions, but freely soluble in alkaline fluids. As in the case of tannalbin, its astringent properties are not manifested until it reaches the intestines, where its decomposition is effected.

Experience in the use of these remedies warrants the opinion that they may be used interchangeably; that they are free from irritating properties, even when administered in large amounts; and that they have a definite, if but limited, field of usefulness in the treatment of intestinal catarrh. Like all other astringents, they are contraindicated in the beginning of acute enteritis,— that is, while irritating substances are still present. In this stage the indications are obvious: to withdraw the ordinary food, especially milk, and to unload the bowel thoroughly by means of calomel or castor oil. In enterocolitis douching the colon once or twice a day is also of great service. After this treatment has been carried out, opium in small doses, notwithstanding the theoretical objections urged against its use, is of the utmost value, and in many cases a combination of paregoric with some simple astringent, such as bismuth subnitrate, will be all that is required. In some cases, however, the discharges still continue to be profuse and watery, and the life of the child is threatened by exhaustion; it is then that tannalbin or tanningen is often extremely efficacious. In chronic diarrhœa and dysentery these astringent compounds prove disappointing, and in tuberculous enteritis, of course, no very favorable results are to be anticipated.

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[1] Gaz. deg. Osped. e delle Clin., No. 36, 1898.
[2] Post-Graduate, November, 1897.
[3] Therapeutische Monatshefte, vol. xii., No. 49.

Tannoform is a combination of tannic acid and formaldehyde. It appears as a pale-pink powder, insoluble in water, but soluble in alkaline fluids. It escapes decomposition in the stomach, but in the intestines it is slowly broken up, yielding free tannin and formaldehyde. The dose for a child is from one to two grains, for an adult from four to six grains, three to six times a day. Although much testimony has been brought forward as to the value of this remedy in acute intestinal catarrh, it must be admitted that it is not free from irritating properties. · In most cases the addition of some less objectionable antiseptic to one of the other astringent compounds will be found more satisfactory. As an external remedy, however, tannoform is not without value. Hesse and Adler speak very favorably of its use in excessive sweating of the feet. Hesse recommends a mixture of tannoform, one part, and Venetian talc, two parts. This remedy will be found especially useful when the condition is associated with more or less maceration of the tissues. According to Goldman, suppositories containing five per cent. of tannoform are serviceable in hemorrhoids, and Ullmann and Landroux have successfully employed it as a dusting powder or in the form of a ten per cent. ointment in eczema and burns.

NEW MORPHINE DERIVATIVES.

Attempts to find an effective substitute for morphine which should possess none of the drawbacks of the latter drug have resulted in the production of three compounds, known respectively as heroin, dionin, and peronin.

Heroin is the diacetic ester of morphine. It appears as a white crystalline powder, of a slightly bitter taste. It is insoluble in water, but readily dissolves in the presence of acids. Its physiological action was first studied by Dreser,[1] who concludes that it slows and deepens the respiration and increases the gaseous interchange; that its action on the heart and the vasomotor system is altogether secondary to its influence on the respiration; and that its sedative action is greater than that of either morphine or codeine, while it is only one-tenth as poisonous as the latter. Though the drug has undoubtedly established for itself a definite

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[1] Therapeutische Monatshefte, September, 1898.

place as a sedative for the alleviation of cough and dyspnœa, later reports indicate that it is not so free from a depressant effect as Dreser supposed. Harnack, Santesson, Winternitz, and Fraenkel believe it to be more toxic than codeine. Nearly all observers agree that one-twelfth of a grain is an average dose and that larger doses than one-sixth of a grain should not be given. Although Klink [1] has administered as much as five-sixths of a grain three times a day without untoward effects, larger doses than one-third of a grain a day are frequently followed by nausea, headache, dryness of the throat, vertigo, constipation, or numbness of the limbs.

Of the numerous papers which have appeared dealing with the use of heroin in affections of the chest, the one by Manges [2] is the most comprehensive. In order to ascertain the general opinion of the profession regarding the drug, this author sent out letters, to which one hundred and forty-one replies were received. Of these only four were outspoken against it; fifty were, in general terms, in favor of it; eighty-two represented a large experience of a varied kind. In a total of four hundred and sixteen cases the failures amounted to twenty-one per cent.

In our experience heroin has not been so generally useful as codeine in allaying the cough of bronchitis and phthisis, and in chronic heart disease morphine hypodermically has been far more satisfactory in relieving dyspnœa and restlessness. In asthma and emphysema, however, the soluble hydrochloride of heroin, especially when administered hypodermically, has been far more effective than the sedative remedies heretofore employed. When apomorphine is prescribed as a sedative expectorant, it should not be added to solutions of heroin hydrochloride, as it is incompatible with the latter.

Dionin is the hydrochloride of the mono-ethyl-ester of morphine. Korte [3] found it especially useful in asthma and the irritating cough of phthisis. It has a great advantage over heroin in being freely soluble in water. According to Winternitz,[4] it does not depress the respiration and it has no unpleasant effect on the

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[1] Münch. med. Wochenschrift, No. 42, 1899.
[2] New York Medical Journal, January 13, 1900.
[3] Therapeutische Monatshefte, January, 1899.
[4] Ibid., September, 1899.

stomach. As an analgesic it is far less powerful than morphine; as a sedative it probably stands midway in efficiency between codeine and morphine. It may be prescribed in the same doses as codeine.

Peronin is the hydrochloride of the benzyl ether of morphine. It was first studied by von Mering, who found it less active than morphine, but freer from disagreeable after-effects. Later researches indicate that, while it is a somewhat more powerful sedative than codeine, it is also more toxic. A sufficient number of clinical observations have not yet been made to determine the exact rank of peronin, but, in view of its slight solubility, its unpleasant taste, and its relatively high toxicity, it would seem to have few, if any, advantages over codeine.

GELATIN.

Dastre and Floresco first called attention to the fact that gelatin possesses the power of increasing the coagulability of the blood; but Carnot[1] was the first to bring the drug prominently forward as a hæmostatic. The best results have been obtained in cases in which it was possible to bring the gelatin directly in contact with the bleeding surface. As a local application Carnot recommends a solution of five parts of gelatin in one hundred parts of water. This may be sterilized by heat, but not at a temperature higher than 239° F. In internal hemorrhage good results have been obtained by administering solutions of gelatin subcutaneously, but this method of treatment is not free from danger. In threatening hemorrhages fifty cubic centimetres of the following solution may be injected deeply into the thigh or gluteal region: gelatin, seven grammes; salt, ten grammes; water, one thousand grammes; filter and sterilize. In the hands of Huchard this solution proved very efficient in controlling severe hæmoptysis occurring in a patient with phthisis. In hæmophilia and purpura hæmorrhagica also this treatment has been found very efficacious. Schwabe[2] reports a case of hæmaturia in a patient with recurrent nephritis in which, after failure of the usual hæmostatic remedies, prompt and permanent relief was obtained by the injection into each infraclavicular

[1] Presse méd., September 18, 1897.
[2] Therapeutische Monatshefte, June, 1900.

region of seven drachms of physiologic salt solution containing two per cent. of pure gelatin, followed by the daily internal administration for a week of a pint of ten per cent. gelatin solution. On the other hand, Freudweiler[1] reports two cases of hemorrhagic nephritis in which the use of gelatin brought on a marked hæmoglobinuria, and increased the amount of albumin and the number of tube-casts. In another case uræmia quickly developed after the use of gelatin.

Good results have been claimed in internal hemorrhages from the administration of gelatin by the mouth. From one-half to one ounce of a ten per cent. solution of gelatin may be given every quarter or half hour in cases of intractable bleeding.

Lancereaux[2] first called attention to the use of gelatin as a coagulant in the treatment of thoracic aneurisms. In two cases of aneurism of the aorta and in one case of aneurism of the right subclavian artery he obtained satisfactory results from subcutaneous injections of the drug. In two cases of aortitis with dilated aorta, however, there was no amelioration of symptoms, and at the autopsy there was no clotting of blood in the dilated artery. Huchard also obtained a good result in a thoracic aneurism, but he found the treatment painful and not free from danger. Conner[3] reports three cases of thoracic aneurism treated with injections of gelatin. He found the treatment very painful, and not particularly beneficial. Futcher[4] reports nine cases in which the gelatin treatment was tried at the Johns Hopkins Hospital. Two hundred and fifty cubic centimetres of a one per cent. solution of white gelatin in normal salt solution were injected into the subcutaneous tissue of the thigh or abdomen, under strict antiseptic precautions, every fifth day. In not a single instance was the aneurism cured. In seven of the nine cases, however, there was appreciable diminution in the subjective symptoms. In no case was there local suppuration, but the injections were very painful, and in several instances they were followed in from two to four hours by a chill and a decided rise of temperature. Fatal terminations following this treatment have occurred in at least two cases,

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[1] Centralbl. f. innere Med., July 7, 1900.
[2] Presse méd., No. 92, 1898.
[3] Philadelphia Medical Journal, May 12, 1900.
[4] Journal of the American Medical Association, June 27, 1900.

one in the practice of Barth, the other in that of Boisset. The
danger is due to too rapid coagulation and embolism. Although
no cures have been reported, and although the treatment is painful
and not free from danger, a review of all the reported cases justi-
fies Futcher's conclusion that it is not without merit. From the
administration of large doses of gelatin by the mouth, Beck[1] ob-
served marked improvement in a man with an aortic aneurism,
seven and one-half inches in diameter, which was eroding the
sternum. The size of the tumor was not diminished, but the pul-
sation and hoarseness almost disappeared and the man was able
to resume business.

UROTROPIN.

Urotropin has already gained for itself a high rank as a urinary
antiseptic. It is produced by the action of formaldehyde on am-
monia, and it was first introduced by Nicolaier for the purpose
of dissolving uric acid calculi and for preventing the development
of bacteria in urine. Casper,[2] and later many others, showed con-
clusively that the drug had no solvent effect upon renal concretions,
but that it was a most valuable remedy in cystitis, especially when
the urine was ammoniacal. It is one of the few new drugs upon
which the reports as to efficacy have been well-nigh uniformly
favorable. When taken internally in moderate doses (from five
to ten grains), it excites no ill effects, but it is rapidly absorbed,
and rapidly eliminated in the urine, partly unchanged and partly,
according to Casper, as formaldehyde. Urine passed during the
administration of urotropin will remain sterile for a long period,
even after being exposed to the air. It is probable that the libera-
tion of formaldehyde continues for some time after the urine has
been secreted by the kidneys. It does not materially increase the
quantity of urine, but it invariably renders that excretion more
acid. It does not seem to be nearly so active in destroying bac-
teria as it does in arresting their growth; but, if its administration
is continued for several weeks, it rarely fails to rid the urine of
pathogenic bacteria. On the gonococcus and tubercle-bacillus, how-
ever, the drug has but little influence. For this reason, it is not
effective in cystitis excited by these organisms. Large doses of

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[1] Medical News, December 3, 1899.
[2] Monatsb. d. Krank. d. Harn- u. Sexual-Apparat., No. 1, p. 1, 1898.

urotropin, if long continued, sometimes give rise to frequent mic-
turition and burning in the bladder and urethra, but these symp-
toms rapidly disappear after the withdrawal of the drug. Baum
and Belfield each report a single instance in which palpitation and
pronounced weakness of the heart's action occurred in patients
without cardiac disease whenever urotropin was given. The rem-
edy is indicated in the various forms of pyelitis and cystitis,
especially when these affections are not dependent upon the pres-
ence of gonococci or tubercle-bacilli and when they are associated
with ammoniacal urine. Excellent results are often obtained from
its employment in the obstinate cystitis which accompanies pros-
tatic hypertrophy. When the urine is already acid in reaction, uro-
tropin must be given with considerable caution, since the increased
acidity which it occasions may render urination very painful.

As the urine of typhoid patients frequently contains enormous
numbers of typhoid bacilli, Horton-Smith [1] and Richardson [2] have
advocated the internal use of urotropin in this disease, in order
to sterilize the urine; but such a procedure is rarely necessary,
and might in some cases be provocative of harm. In the absence
of inflammatory complications of the genito-urinary tract it is far
more rational to disinfect the urine after it has been voided.

Keyes, Otis, and others have found urotropin of the utmost
value as a prophylactic remedy in preventing infection when ad-
ministered for several days before and several days after opera-
tions on the genito-urinary tract. It is important, however, that
it should not be used too freely in these cases, since when eliminated
in large quantities it is apt to retard the healing of the wound.
As a rule, it will not be found necessary, in order to accomplish
the desired results, to give more than from five to ten grains of
the drug four or five times daily.

METHYLENE BLUE.

A very valuable remedy in those cases of malaria which are
resistant to quinine is methylene blue. Cardomates,[3] Mays,[4] Oll-

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[1] Lancet, May 20, 1899.

[2] Journal of the Massachusetts Association of Boards of Health, July, 1899.

[3] Bull. Méd., 1897, p. 357.

[4] Münch. med. Wochenschrift, June 14, 1898.

wig,[1] and Smithwick[2] testify to the value of the drug as an anti-periodic. When given in appropriate dose, it rarely occasions unpleasant symptoms, but it has the effect of imparting a deep-blue color to the urine, and of this fact the patient should be informed. The usual dose as an antiperiodic is two grains from four to six times daily, in pills or capsules. Large doses of methylene blue occasionally excite gastric disturbance or painful micturition, but the latter, as Klemperer has pointed out, may be prevented by giving with each dose an equal quantity of powdered nutmeg.

Horwitz[3] and O'Neill[4] speak very favorably of methylene blue as a remedy for gonorrhœa. Horwitz bases his conclusions upon an experience with the drug in one hundred and five cases. He asserts that it will not abort the disease, but that when given early, in doses of one grain thrice daily, increased to two grains, it materially shortens its duration and lessens the tendency to complications; and that its beneficial action is enhanced by combining it with copaiba, sandal wood, and salol. Neither of these observers saw gastric disturbance or strangury follow the use of the drug.

Methylene blue has also been used as an analgesic in various neuralgic affections, particularly sciatica. Lemoine[5] found it useful in four-fifths of the cases of sciatica in which he employed it. Klemperer[6] reports twenty-seven cases of sciatica in which methylene blue was given. In eight of these no effect was observed, in six it gave excellent result, and in thirteen the patients were considerably benefited.

EUCHININ.

Euchinin represents an effort to produce a form of quinine having all the advantages of the older preparations without their bitter taste and unpleasant by-effects. It is an ethyl-carbonic ester of quinine, appearing in the form of delicate white needles, which are sparingly soluble in water but dissolve readily in alcohol. Unlike quinine, it is almost tasteless. Its therapeutic action was first

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[1] Zeit. f. Hyg. u. Infektionskrankh., xxxi., No. 2, 1899.
[2] Merck's Archives, February, 1900.
[3] Philadelphia Polyclinic, vol. vii., p. 113.
[4] Medical Record, March 24, 1900.
[5] Bull. gén. de Thérap., April 15, 1899.
[6] Die Therap. d. Gegenw., i., No. ii., 1899.

studied by von Noorden,[1] not, however, in malaria, but in pertussis and febrile states. He found that, while its action was similar to that of quinine, it was not much more than one-half as powerful. Subsequently many observers, including Gray, Zentner, Mori, Goniev, Sukhomlin, and Thayer, found it efficacious in malaria; but, unfortunately, they also discovered that it was by no means free from the disagreeable effects of quinine, and that symptoms of cinchonism not infrequently followed its use when the dose was sufficiently large to be effective. It would seem, therefore, that, although it is not likely to prove a formidable rival of quinine, it will be found an efficient and agreeable remedy for children, owing to its being almost tasteless.

The hydrochloride of euchinin is freely soluble in water, but, unlike euchinin and euchinin tannate, it has an extremely disagreeable taste.

SODIUM CACODYLATE.

This arsenical preparation was first suggested by Gautier. It is the sodium salt of cacodylic acid, which is obtained by the oxidation of an organic combination of arsenic,—namely, dimethylarsenic or cacodyl. Sodium cacodylate contains about fifty per cent. of arsenic; it appears in the form of white crystals or an amorphous powder, freely soluble in water. The crystalline form should be selected in preference to the amorphous, since the latter has a well-marked acid reaction. The advantages claimed for this preparation of arsenic are its freedom from irritating properties and its very slight toxicity. That it is comparatively innocuous is due to the fact that the arsenic does not enter the circulation in the free state, but as an organic compound. Besredka showed that, when arsenic is injected into the subcutaneous tissues or into the peritoneum, it is taken up by the leucocytes and converted into an organic form, in which state it is one hundred times less poisonous than unmodified metallic arsenic. Gautier demonstrated that from one and one-half to three grains a day of sodium cacodylate could be administered internally for long periods, and that it is practicable to give nearly the same dose hypodermically to patients who could not tolerate one-third of a grain of arsenic in the form of Fowler's solu-

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[1] Centralbl. f. innere Med., November, 1896.

tion. Prokhorow [1] contends that, when taken internally or injected hypodermically, cacodylic acid exercises a stimulating effect, which is manifested by an improvement in the general condition of the patient and of his appetite and increase of the body-weight; that it does not, even in large doses, interfere with digestion; and that it is rapidly split up within the body and finally eliminated by the kidneys and lungs.

The daily dose of sodium cacodylate varies from a grain to one and one-half grains hypodermically, and from two to three grains by the mouth or rectum. Every eight or ten days the treatment should be interrupted for a period of eight or ten days, after which it may be resumed.

Gautier, Manchetti, and Rendu object to the administration of the drug by the mouth. They declare that when it is so administered it imparts an alliaceous odor to the breath, and that it may become poisonous if it meets with reducing agents in the alimentary canal. Grasset and Brousse, however, do not assent to this view. They have given it by the mouth in many cases without observing any intolerance.

During the last two years there have been many favorable reports from reliable sources as to the value of this form of arsenic in phthisis, anæmia, chorea, and certain skin affections, such as lupus, lichen planus, psoriasis, and epithelioma. In the hands of the writer, while it has not proved more effective than other arsenical preparations, it has given very satisfactory results; moreover, when administered hypodermically it never caused local irritation, and in doses of one and one-half grains daily it could be taken for long periods without exciting untoward symptoms.

CHLORETONE.

Chloretone, or trichlor-tertiary butyl alcohol, is a compound formed by the addition of caustic potash to equal weights of chloroform and acetone. Its valuable properties as a local anæsthetic and hypnotic were first brought to the attention of the profession in an article by Houghton and Aldrich.[2] It appears as a white crystalline powder, with a camphoraceous odor and taste. It is

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[1] Wratsch., No. 19, 1899.
[2] Journal of the American Medical Association, September, 1899.

sparingly soluble in cold water, but freely soluble in chloroform, ether, and strong alcohol. The usual dose as an hypnotic is from fifteen to twenty grains. It may be conveniently administered in the form of powders or compressed tablets. As an hypnotic it is most effective in the insomnia which is not associated with organic disease. In neurasthenia twenty grains at bedtime will often induce refreshing sleep lasting from six to eight hours. In chronic heart disease, when the symptoms are not very severe, chloretone is sometimes useful; but when anxiety, restlessness, dyspnœa, and precordial distress are prominent symptoms, morphine hypodermically is a far more satisfactory remedy. In chronic nephritis it is often very effective. In pneumonia, typhoid fever, and other infections, during the height of the fever it is far less reliable than many other hypnotics. In convalescence from acute diseases, however, it usually gives gratifying results. In phthisis its action is very irregular. It is particularly liable to fail when there are well-marked febrile symptoms. Cough and night sweats are not influenced in any way by the drug.

In view of the pronounced anæsthetic properties of chloretone when applied to a denuded surface, it was thought that the drug would be especially valuable in organic disease of the stomach, both by relieving the pain and promoting sleep, but in the cases of gastric cancer and ulcer in which we have tried it the results were disappointing.

In delirium tremens chloretone is, as a rule, much less efficacious than paraldehyde, bromides, or hyoscine. In painful affections—neuralgia, pleurisy, and acute articular rheumatism—it is much inferior to opium.

Beyond producing slight drowsiness on the day following its administration, chloretone rarely gives rise to untoward symptoms or to unpleasant after-effects. Nausea and vomiting are not excited by it. As an hypnotic its action is prompt, sleep usually following in from half an hour to two hours after its administration. The drug has little influence on the circulation; even in cases of chronic heart disease there is no evidence of a depressant action. It often loses its power to induce sleep when given continuously, and for prolonged employment it is probably inferior to chloral, sulphonal, or paraldehyde. In insomnia due to pain it is of little value, and in sleeplessness caused by extreme mental excitement

it is inferior to hyoscine and paraldehyde. It is not often success-
ful in the presence of fever, at least when the temperature is above
102° or 103° F. In ordinary doses it appears to be a perfectly
safe drug. Houghton and Aldrich state that as much as sixty
grains have been given at one time without producing any untoward
symptoms, and Donald[1] cites the case of a victim of the morphine
habit who during a period of but little more than forty-eight hours
took one hundred and ninety-two grains of chloretone, and in con-
sequence slept almost continuously for nearly six days, when he
awoke none the worse for his experience.

It appears that we have in chloretone a safe hypnotic of moder-
ate power, which rarely causes unpleasant after-effects, but of which
a toleration is quite rapidly acquired, which is especially adapted
for use in cases of insomnia unattended with pain, high fever, or
pronounced nervous excitement.

ANIMAL EXTRACTS.

Of the many animal drugs with which the market has been
flooded since Brown-Séquard reported such remarkable results from
orchitic extract in impotence and other nervous affections (1889),
only two have proved worthy of confidence,—namely, extract of
thyroid gland and extract of suprarenal capsule.

Thyroid Extract.—The value of thyroid extract in cretinism
and other forms of myxœdema is so well known that it need not
be commented upon at this time, but its efficacy in certain conditions
which are on the borderland of myxœdema is not so well known.
Musser[2] has recently called attention to the value of the extract
in certain children who possess none of the physical characteristics
of cretinism, but who have a dull, listless expression, are mentally
backward, are uncleanly in their habits, and are peevish and
fretful.

The loss of flesh following the administration of thyroid extract
suggested its use in obesity. Ebstein believes that the treatment
is not a rational one, since the drug causes a waste of the body-
proteids as well as of the fats; but Leichtenstern, Ewald, Mathieu,
Grawitz, and others have used it in corpulence with asserted ex-

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[1] Therapeutic Gazette, January 15, 1900.
[2] International Medical Magazine, November, 1900.

cellent results. The treatment is most effective in those cases which bear a certain resemblance to myxœdema, in which the skin is pale and the tissues are soft and flabby. Unfortunately, many patients rather rapidly acquire a tolerance of the drug, and for this reason relapses are not uncommon. Large doses should be avoided; they often cause considerable depression. A daily maximum of three grains should rarely be exceeded.

The hope that thyroid extract might prove valuable in certain forms of insanity has not been realized. While some observers, notably Mabon and Babcock[1] and Easterbrook,[2] have found it useful in acute melancholia, acute mania, puerperal and climacteric insanities, and stuporous states, the testimony of most observers has been unfavorable.

Thyroid extract seems to have a special influence upon the uterus. There is strong evidence of its value in metrorrhagia, when the latter is not dependent upon carcinoma. Not a few gynæcologists have found it useful in arresting the growth of uterine fibroids. Montgomery[3] has recently reported gratifying results from its use in certain forms of sterility. He was led to employ the drug in the treatment of this condition after having seen some cases in which women become pregnant after its use for obesity. One patient lost seventy pounds under the treatment and then became pregnant. In another patient, who had never menstruated and who had been married eight years, the surgeon removed an enlarged ovary and punctured a number of cysts in the other ovary. Following this operation she began to menstruate regularly. She was desirous of having children, and after menstruating a year she began the use of thyroid extract. She became pregnant, and gave birth to a child at full term.

In the early stage of simple goitre thyroid extract is undoubtedly of value as a resolvent; under its use the swelling may entirely disappear. In exophthalmic goitre, however, it should not be employed.

Within the last year Lambert, Gauthier, Reclus, and Quénu have published cases which indicate that the extract may render

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[1] Therapeutic Gazette, February 15, 1900.
[2] Scottish Medical and Surgical Journal, December, 1900.
[3] International Medical Magazine, November, 1900.

good service in the treatment of fractures, particularly when there is delayed union .

Mabille [1] found that from three to twelve drops of Fowler's solution offset the untoward symptoms occasioned by full doses of thyroid extract. Ewald [2] has confirmed Mabille's observation. In seven cases iodothyrin was administered in progressive doses of from four to thirty-eight grains each day; at the same time from one-sixty-fourth to one-eighth of a grain of arsenic was given daily. Beyond occasional increased frequency of the pulse no symptoms of thyroidism appeared, so that the course could be continued uninterruptedly.

Extract of Suprarenal Gland.—This drug has two important actions upon the circulatory system: when applied locally to mucous membranes, it causes a marked constriction of the blood-vessels; when injected into a vein, it causes a distinct, but temporary, rise of blood-pressure. These physiological effects are apparently due to a constituent of the gland named by Abel epinephrin. The base, which is of an alkaloidal nature, has not been isolated, but several of its salts have been prepared and studied. The rise of blood-pressure induced by the drug seems to be due partly to a direct action on the heart or its contained ganglia, and partly to a constricting effect on the peripheral vessels. This influence on the pulse is pronounced only after the intravenous injection of the extract. When it is injected under the skin, the effect is slight and transitory. When it is given by the mouth, it produces no sensible rise of blood-pressure. So it is evident that no marked benefit could be expected from the remedy in the treatment of heart-failure, and in a number of instances in which it was employed the results were negative.

As a local remedy, however, in acute inflammatory affections of the eyes, nose, and throat, the extract is of great value. When an aqueous solution is sprayed on mucous membranes, there is an immediate blanching of the part, which may last for several hours.

When locally applied, it is non-irritating and never occasions any systemic disturbance. In the eye it does not affect the pupil nor the muscles of accommodation. In operations on the nose

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[1] Rev. de Thérapeutique, No. 9, 1899.
[2] Die Therapie der Gegenwart, September, 1899.

and eye, by lessening the vascularity of the parts it renders anæs-
thesia under cocaine more complete and at the same time lessens
the danger from absorption of the anæsthetic. Recent reports
indicate, however, that its use increases to some extent the liability
to secondary hemorrhage. In severe epistaxis prompt relief is
often afforded by plugging the nostril with cotton soaked in a
solution of the extract. The ordinary solution, made by adding
one part of the dried extract to ten parts of water, which, after
standing for a few minutes, is filtered and then sterilized by
boiling, does not keep very well. The following preparation,
recommended by Lederman,[1] will be found serviceable and more
permanent: ten grains of the extract are added to one drachm
of a twenty-five per cent. solution of glycerin in water. This is
placed in a wide-mouthed bottle and well shaken. After standing
for two days, it is filtered. It is not too viscid for spraying and
in a cool place will keep for some time.

Douglass[2] declares that the internal use of suprarenal gland
in large doses is the most satisfactory of all treatments for hay
fever. He gives five grains of the saccharated extract every two
hours, day and night, until constitutional symptoms develop or
the nasal mucous membrane becomes less hyperæmic. It is then
given every three hours, subsequently every six hours, and finally
twice daily. The latter dose is continued throughout the season.
In the hands of others this treatment has not been so satisfactory.
The large doses suggested by Douglass not infrequently occasion
disagreeable symptoms, especially vertigo and palpitation. As a
local remedy, however, applied to the mucous membrane of the
nose, the extract is very beneficial in hay fever. The following
solution, suggested by Sommers, will be found effective: Extract
of suprarenal capsule, twenty grains; phenic acid, two grains;
eucain β, five grains; distilled water, two drachms. Macerate
ten minutes; filter. This solution will not decompose nor lose its
activity for several months.

The belief that extract of suprarenal capsule is a useful remedy
in Addison's disease is substantiated by considerable evidence.
In most cases, however, the good effects have been only temporary,

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[1] Laryngoscope, No. 4, 1899.
[2] New York Medical Journal, May 12, 1900.

and this is what we should have expected, knowing the incurable nature of the local lesions. One of Osler's patients gained nineteen pounds, the asthenia disappeared, and he was alive two years subsequently, but was still pigmented. Three other cases were not benefited in the slightest degree. Kinnicutt has collected forty-eight cases treated with the extract. Of these, six were reported cured and twenty-two as improved. In estimating the value of these and similar statistics, due allowance should be made for the fact that favorable results are more likely to be published than those which are unfavorable.

TREATMENT OF CHRONIC GONORRHŒA, OR GLEET.

BY ALEXANDRE RENAULT, M.D.,
Physician to the Paris Hospitals.

SECOND CLINIC.

GENTLEMEN,—In my first lecture on this subject I told you how to make the diagnosis of chronic gonorrhœa, how to ascertain whether the disorder was complicated with stricture, how you must first dilate the stricture before treating the gleet, and what the means are at your disposal for the internal treatment of such a discharge. If, now, having strictly followed this internal treatment and diet for two or three weeks, your patient's condition, after improving at the start, remains stationary, you had better abandon the internal treatment and resort to external or local means.

I advise you to commence with copious washing out of the urethra. This method, if handled with moderation and skill, will often effect a rapid cure. Whenever possible, apply this treatment yourself: do not trust it to the patient. You will see, from the details which I shall give you, that it requires minute precautions and constant supervision.

The apparatus needed is simple enough. A glass recipient that will hold about two quarts and that can be raised or lowered at will is the main object; to this vessel should be adapted a long india-rubber tube ending in a canula, and just above this canula you must have some arrangement fitted to the tube for shutting off the water,—a stopcock or a forceps.

After disinfecting the glass vessel and tube with hot boric solution, fill the recipient with the preparation of permanganate of potassium which you are going to use for treating the urethra. This you can prepare as needed from a concentrated solution (1 to 20). For the urethra you must begin with diluted solutions;

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you do not know what may be the susceptibility of the particular urethra you are about to treat, and it is an error to set up too great a reaction at first. Begin, therefore, with a strength of 1 to 5000,—that is, add to each litre of water 0.2 gramme of permanganate. This is easy to do with a measuring glass on which cubic centimetres are marked. With your 1 to 20 concentrated solution you have only to measure off four cubic centimetres to get the amount necessary for one litre. In the same way later on you can gradually strengthen the solution you use to 1 to 4000, 1 to 3500, 1 to 3000, 1 to 2000, etc.

The solution must be used hot. If your patient can stand it at 40° C., you will be fortunate, as we now know that the bactericidal effect of such solutions increases as the temperature grows higher.

The patient should first pass water, and then stretch out in the horizontal position. See that your own hands and nails are irreproachable, and wash the glans and meatus with absorbent cotton and bichloride. Arrange the recipient containing the hot solution of permanganate at a height of fifty centimetres above the patient's level, lubricate the canula with carbolic oil, 1 to 20, pass it into the urethra, and open the stopcock.

The initial part of the operation consists in washing the anterior urethra, which is a necessary precaution; otherwise, if you send the injection at once into the bladder, you run the risk of carrying into it the pus of the anterior portion of the urethra and of giving your patient epididymitis or cystitis. It is even a good plan, to prevent any reflux of this sort, to tell your patient to contract his perineal muscles as though to prevent urine leaving a full bladder.

You will require about half a litre of the solution to cleanse the anterior portion of the urethra. It is not obligatory that the canula should fit tightly in the urethra; even though the liquid flows back freely, irrigation takes place quite satisfactorily.

When you have used this half-litre, close the stopcock and insert the canula again into the meatus, but in such a way as to obturate it entirely. Then, opening the stopcock gradually, so that the stream may not be too strong all at once, ask your patient to relax his muscles as he would if he were about to pass water. The solution will then enter the posterior portion of the urethra and

the bladder without any of it flowing out again.   Stop the flow
as soon as the patient expresses a desire to urinate, and he will
then evacuate the amount of permanganate solution that his bladder
contains.   Repeat this manœuvre as many times as your remaining
half-litre of solution will allow you, and your first treatment is
then at an end.

Your patient must come to you for this treatment every day,
and each time you should increase the strength of the solution
used, but slowly and with prudence.   You will be wise in following
this scale: 1 to 5000, 1 to 4500, 1 to 4000, 1 to 3750, 1 to 3500,
1 to 3250, 1 to 3000, and so on.   You will seldom have to use it
stronger than 1 to 2000, as by the time you get to that degree of
concentration your patient has usually recovered.   Still, you *can*
go to 1 to 1000, but, as I said above, you must do this gradually
and with care.   You must on no account set up irritation of the
urethra, of which you will be warned by sensation of burning when
passing water; if this occurs, you will for a certain time have to
lessen the strength of the solution.   In order to have no inter-
ruption in the progressive increase in your solution, the patient
should feel nothing more than a slight burning the first time he
urinates after a treatment.

When you find that the discharge has ceased, you must not
break off the treatment abruptly.   It is more prudent to continue
until in the morning urine nothing more is seen than thin filaments
almost transparent and that do not fall to the bottom of the vessel.
If you stop too soon, the discharge may begin again in three or
four days.

In all that I have said so far I have supposed that you are
dealing with an easy patient, who will let the solution pass readily
into the posterior urethra and bladder.   This is, however, far from
being the usual case.   In spite of all their efforts, many patients
have a spasmodic condition of their sphincter muscle which closes
the urethra and prevents the solution from going any farther.

In such cases you must try to do away with this spasmodic
state by injecting into the urethra a few grammes of a 1 to 400
solution of cocaine hydrochlorate.   This you can do with a small,
sterilized syringe of a capacity of ten grammes.   As you are making
the injection get your patient to relax himself as though to pass
water, and let the solution remain in the urethra for two or three

minutes by closing the meatus with your fingers after withdrawing the syringe. If you apply the treatment five minutes later, which is about the length of time necessary for the cocaine to act, you will have a fair chance of getting the permanganate solution into the bladder. Some patients after two or three applications of cocaine no longer require it and their spasm disappears.

This permanganate washing often dries up the discharge completely, but in certain cases there remains a slight secretion of mucus, which may be due either to the treatment or to secondary infection. To get rid of this secretion give the patient capsules of sanal oil or turpentine, 0.25 gramme, two capsules four times a day. You will also in such cases get good results with bichloride washings, 1 to 25,000 or 1 to 20,000. To prepare such a solution add to a litre of boiled water, hot, a powder of four or five centigrammes of bichloride. Usually two or three washings will suffice.

If the permanganate fails, your next remedy should be *protargol,* which is a new salt, a compound of silver with a proteid substance, having the appearance of a fine, yellowish powder, and being soluble in either cold or hot water. The usual strength for washings is 1 to 1000, but, to be on the safe side, you had better use 1 to 4000 and 1 to 2000 first. If these are well tolerated, do not lose any time, but go to 1 to 1000 at once, and that strength will be sufficient to effect recovery.

The technique and precautions to be taken with this remedy are just the same as with the permanganate. When on examining in the morning the discharge is found to have ceased, it is wise to give five or six further treatments, and when these have been stopped, to keep the patient on a strict diet for from ten to twenty days more, for fear of one of the relapses that are so common and that are so trying to both patient and physician. I have recently tried a new antiseptic in such cases, *aniodol,* which is nothing but trioxymethylene solidified by a special process. So far the results with it have been satisfactory.

While the washing process is an excellent method of treating chronic gonorrhœa that has resisted all internal treatments, the method is, unfortunately, inapplicable to some patients, with whom nothing can overcome the resistance of the sphincter, which remains tightly closed and prevents absolutely the penetration of the solution into the posterior urethra and bladder.

With these patients you must fall back on the instillation method. For this purpose two preparations are in current use,— (1) nitrate of silver 1 to 100 or 1 to 50, whose reputation is solidly founded; (2) protargol five per cent., which is still on trial. I have used the latter on many occasions, but cannot say that it has succeeded very remarkably in my hands. Other physicians have been more fortunate.

As for nitrate of silver, in some cases its action is wonderful: one or two instillations effect a cure. Usually a greater number is required, and to get a definite result ten instillations may be necessary. But by the side of these favorable cases are others where the treatment not only does no good but may even make the case worse. You are warned of this by an increase in the discharge, which is continuous. It is customary to see a little more discharge the day after each instillation, but this increase does not last, being the result of the substitutive treatment; on the second day the discharge has usually much diminished. When, on the other hand, the treatment is doing harm, the increase continues; in such cases you must stop the remedy and have recourse to something else.

The instillation treatment requires a special syringe; also a *bougie à boule,* twelve millimetres in circumference, with a canal through its entire length. The solution to use at first is nitrate of silver 1 to 100. You had better see how the patient bears that strength before proceeding to 1 to 50.

Fill the syringe with the solution; fit the bougie closely to its point, and then turn the screw-piston until the drops begin to fall from the end of the bougie. Remember that each half-turn of the piston-handle corresponds to one drop. Your patient lies at full length; you protect his clothes and the lounge against the nitrate of silver, and proceed to the usual careful toilet of the glans, foreskin, and meatus, and of your own hands. Syringe out the urethra with hot boracic, and while doing this have the patient contract his sphincter muscle to prevent any liquid passing into the posterior urethra and bladder.

When this has been done, dip the bougie in carbolic oil and insert it, telling the patient again to contract his sphincter, as it is important for you to be sure when the end of the bougie reaches that distance in the canal. When you feel that it hits against a

distinct obstacle and will go no farther without forcing, ask your patient to relax his muscles as though to urinate, and carry the end of your bougie three centimetres farther; you will then be quite positive that it is in the prostatic portion of the posterior urethra.

You next begin to let the drops fall by turning the handle of the screw-piston. Do not leave them all at the same spot: when you have made three turns, draw the bougie a little out and leave some there. When you have done this a second time, you know that you have treated the whole diseased surface. You thus leave about ten drops in all, and then withdraw the instrument.

This treatment should be repeated every two days or only twice a week, according to the reaction it sets up. The number of drops can be raised gradually from ten to thirty.

Recovery is indicated by the disappearance of the morning secretion, following the slight aggravation noticed the morning after the instillations. If the condition does not improve after three or four treatments, you must employ stronger solutions, 1 to 50 or even 1 to 20, though the latter is rarely necessary. When the nitrate treatment is destined to succeed, you seldom have to go beyond 1 in 50.

If after ten or twelve treatments the secretion still persists, give up the method, at least for a time, as you can expect nothing from it. Either select another form of treatment, or else let your patient rest for a month and then try the instillations afresh. The second series may succeed though the first failed; or at the second series you can try protargol in place of the silver nitrate. Protargol has the advantage of being painless, and its results are in some instances very satisfactory.

I have purposely refrained from speaking of other solutions, such as those of bichloride of mercury or sulphate of copper, which can be used in the place of nitrate of silver and protargol; they are more irritating than the latter and the results they give far less reliable.

I must still mention a third method, with which I have succeeded in some instances and to which you can resort if washings and instillations fail; I refer to the introduction into the urethra of medicated bougies.

These bougies are made of solidified glycerin, or of a mixture of glycerin and gelatin in such proportions that they can be easily

passed into the urethra and yet are not so rigid as to damage it. They contain substances that are astringent or that modify the condition of the mucous membrane, such as chloride of zinc, sulphate of zinc, ratanhia, tannin, ichthyol, perchloride of iron, or iodoform, in doses suitable for the urethra. In Paris bougies of this sort already prepared in every variety can be had at druggists'; in the sterilized tubes in which they are supplied they should remain perfectly aseptic until needed for use.

When you wish to employ one, first get your patient to urinate; then, with all the usual precautions of antisepsis and cleanliness, pass the bougie into the urethra until it disappears almost completely. The bougies are about sixteen centimetres long, which is, as you know, the average length of the urethra. Protect the glans with some soft linen, so that the patient's clothes or bed shall not be soiled by the melting of the bougie, and keep the whole thing in place by a protector of thin india rubber. It is preferable to use this treatment only at night, for the twofold reason that when the patient is in bed the bougie has a better chance of not getting displaced, and that this treatment is one that can hardly be kept up the whole twenty-four hours without causing too much irritation. This is the drawback to this treatment; in some cases it irritates the urethra to excess and has then to be given up definitely.

I shall not go into details as to the other methods proposed for the treatment of chronic gonorrhœa, such as the direct applications of remedies to the diseased surface by means of the endoscope, and prostatic massage. The former is not a method at every one's disposal, and often sets up renewed inflammation; the latter, followed by a lavage or instillation, has been much employed in Vienna. It is disagreeable to both the patient and the physician, in some cases is painful, and, so far, has not succeeded in my hands to the extent that I expected. Still, the method seems rational, and perhaps deserves to be tried more perseveringly than I may have hitherto done.

With the lavage and instillation methods we have at our command means whereby we can cure almost every case; the great point is to use them skilfully and with conviction. I do not deny that there are cases that cannot be cured by any treatment, but they are very rare, and even with them we can reduce the secretion to a non-infectious colorless liquid.

This is easy to verify. Let your patient drink beer freely for two or three days, and then examine a little of the secretion under a microscope; if there are no gonococci, he has nothing to fear. This necessitates a certain outfit and a relative familiarity on your part with such research; but this is not at all diffcult, and the method is, in my opinion, indispensable in many cases,—as, for instance, when your patient wants to marry. The disastrous action of the gonococcus on the female pelvic organs is nowadays too thoroughly understood to make it allowable to omit any precaution of this nature. In case of marriage, therefore, this bacteriological examination is a *sine qua non*. In almost all cases these colorless secretions are harmless, and regular sexual intercourse with a healthy woman is one of the means of removing them; but you must be certain of your case.

This physiological form of treatment of the colorless secretion is a slow one, and the patient is always afraid of a relapse. I hope, therefore, that further discoveries will help us out on this point. The problem is to clean out thoroughly the acini of the posterior urethra, which are the final lairs of the infectious elements, whose presence is revealed by the urinary filaments, and to modify and heal their secreting mucous covering. The steady advance in biological chemistry gives promise that this important problem will ultimately be solved. When this is an accomplished fact, patients and physicians will offer up thanks, as chronic gonorrhœa is one of the complaints that affect most deeply the mental condition of the patient and that give the medical adviser the most difficult obstacles to surmount.

THE TREATMENT OF ECZEMA.

BY PROFESSOR H. HALLOPEAU,

Professor Agrégé of the University of Paris and Secretary-General of the
French Society of Dermatology.

GENTLEMEN,—Eczema is a parasitic disease which occurs
among people who are predisposed to become the habitat of certain
bacteria. Its parasitic nature is demonstrated by a number of
observed facts. In the first place, certain parasites of a specific
nature—as, for instance, the micrococci described by Unna—have
been found in the vesicles of acute and in the crusts or scales of
chronic eczema, and there now remains no doubt of the autoinocu-
lability of the disease. Patients can by scratching transfer the
affection from one part of the body to another, or cause it to extend
in parts where it already exists. Certain forms of eczema, espe-
cially the seborrhœic variety, can be transmitted by contagion. The
most efficient remedies for eczema are certain parasiticides, such as
pyrogallic acid, oil of cade, salicylic acid, and silver nitrate.

It has been said and is still asserted by many that an affection
cannot be assumed to be surely of parasitic origin unless its specific
parasite can be obtained in pure culture and the disease be repro-
duced by inoculation. We have not reached this stage of scientific
knowledge with regard to eczema, but everything else points to its
parasitic nature. After all, it must be borne in mind that in a
number of infectious diseases of undoubted parasitic origin these
criteria fail of attainment. While we know absolutely nothing of
the parasite that causes syphilis, there is now no authority in vene-
real diseases who doubts its parasitic character. In this respect
eczema is gradually coming to occupy very nearly the same place
in the minds of medical men as does syphilis, and in the rational
treatment of the disease this opinion must, above all things, be
taken into consideration. There are a number of conditions in the

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skin itself that predispose to the occurrence of eczema. For instance, it is not unusual to observe the disease in patients whose skin presents certain congenital or acquired modifications of structure. This is most frequent among those who are born with some ichthyosis. The general tendency of old people to suffer from chronic eczema presents the best example of acquired predisposition to the disease. The cause is deficient cutaneous nutrition because of diminished peripheral circulation, and eczema is much more obstinately recurrent among subjects who suffer from this special predisposition than it is among individuals whose skin is normal. This fact should enter into the prognosis of the disease when it first comes under observation.

Certain dermatoses are frequently complicated by eczema. Hebra's prurigo is one of these, and the eczematous complication is often the principal feature of the disease. As is well known, the various forms of vesicular eczema are often combined with seborrhœa, and in some acute attacks of the latter affection vesiculation and the moist or sweating stage peculiar to eczema may frequently be noticed. Such forms of the disease occur specially on the scalp, on the face, on the ears, and on the pubis. Potent factors in the production of eczema are the various forms of disturbance of circulation which interfere with the nutrition of the skin. Among these varicose veins in particular must be noted. Varicosities of the lower extremities give rise to a most intractable form of eczema. Disturbance of the rectal circulation and of the union between the portal and the cutaneous circulation which occurs at the anus gives rise to eczema that constantly recurs despite the most careful treatment applied to these parts.

In any treatment of eczema the first condition must be the removal, so far as possible, of the causes which produce and predispose to the disease. One of the best examples of the rapid disappearance of eczema when the cause no longer exists is furnished by that variety of the affection due to the presence of pediculi. Until the parasites are destroyed the cure of the eczematous condition is impossible. Just as soon as they have been made to disappear the disease vanishes.

Eczematous conditions of the hands are very often associated with an acute artificial dermatitis. Their treatment, especially at the beginning, is the same as that of acute dermatitis. The hand

should be bathed frequently and swathed in distilled water or in very dilute picric acid solution (1 to 400). If œdema and superficial suppuration occur with the eczematous dermatitis, these mild remedies suffice until all acute symptoms have disappeared. After this the treatment for chronic eczema should be applied. In eczema of the hands it is an essential condition of all treatment to avoid every form of irritation, and especially that due to the use of soap. The hands should never be washed in the usual way in soapsuds, but should be cleansed either by bread-crumbs, vaseline, bran water, or almond paste. If the use of soap be absolutely dispensed with, this precaution of itself suffices for prophylaxis against eczema of the hands in individuals who are not forced to make use of irritating substances in their professions or trades.

When no external source of irritation can be discovered as the cause of eczema, various organic disturbances should be looked for, and they will nearly always be found. First of all, attention should be directed to the gastro-intestinal system. If there exist any sign of dyspepsia, this should be treated at once and a proper diet recommended to the patient. When there has been a marked amount of pruritis in the initial stage of the disease,—that is, before the appearance of any eruption,—and when this pruritus manifests itself in a series of foci all over the body, even though there should be no gastro-intestinal symptoms, treatment of the digestive organs is always indicated. Dr. Laredde, whose opinion I value very highly, and who has carefully studied the question, says that when in such cases there are no well-marked symptoms of gastro-intestinal derangement the stomach contents should be examined by means of the stomach-tube and an investigation of the gastric secretion carefully made. The use of the stomach-tube proves disagreeable to the patient, but is indispensable in many of the serious cases. There can be no reasonable assurance of the non-existence of fermentative dyspepsia without an examination of the stomach contents. Repeated examinations of the gastric secretion at regular intervals are the only means of estimating the improvement due to diet and to treatment; for this improvement is not revealed by the physical signs, nor by any functional symptoms until the cure is almost completed. In the mean time errors in diet that, persisted in, will cause the eczema to become inveterate may be discovered and corrected.

In the adult, as a rule, the first indication in a case of eczema is to reduce the quantity of food taken to the amount which is absolutely necessary. A superabundant diet is undoubtedly a frequent cause of eczema and a still more frequent cause of exacerbations of the disease when it has once been established. In dyspeptic patients a too liberal diet precludes the possibility of cure.

Among the varieties of food which, as a rule, should be forbidden are all those that contain much fat, or are irritating, or liable to produce fermentation. For instance, sausage and minced meat, pork, preserved meats of various kinds, venison, sea fish, cheese, and pastry should be omitted from the dietary. Sauces must be proscribed, and the food should be prepared as simply as possible and with the minimum amount of fatty material. Spirituous liquors of all kinds (even weak wine and beer) should be forbidden. The patient should be instructed to take some mineral water that he knows agrees with him or should drink simply ordinary water. Milk, which is a useful addition to the diet of eczematous patients who are also suffering from renal disease, must be forbidden to dyspeptics. The reason is its proneness to set up fermentative processes wherever digestive disturbance exists even to a slight degree. In certain cases, though, these will have to be determined by experiment. Sterilized milk may be given to eczematous dyspeptics. Bread, which proves a frequent source of lactic acid, should be limited as much as possible. That which is allowed should be very well toasted, because patients will then use less of it.

For the digestive disturbances which accompany eczema certain remedies have been found very efficient. Dr. Laredde prescribes a teaspoonful of the following solution twice a day, taken after each of the principal meals:

R Ammon. fluorid., 0.50 gramme (gr. viii) ;
Aq. destillat., 800 grammes (℥ x).
Sig.—A teaspoonful twice a day.

This remedy often seems to correct gastric disturbances of a general character and acts as a tonic to all the digestive glands.

In a case of butyric fermentation the following powder may be given, at meals, twice a day:

℞ Erythrol (double bismuth and cinchonidine iodide), 0.1 gramme (gr. iss) ;
    Magnes. calcin., 0.2 gramme (gr. iii).

Erythrol acts as an efficient antifermentative and allayer of irrita-
tion.   Its after-effect—far from being depressant, as are many of
the substances intended to allay gastric irritation—is rather tonic.
If constipation exists, sufficient rhubarb or senna to assure regular
stools may be added to these powders.   If the powders are given in
cachets they will not disturb the appetite by their taste.   Naph-
thol in doses of sixty centigrammes (about ten grains) will ren-
der efficient service as an antifermentative in certain obstinate
cases.

In children suffering from eczema for which there is no apparent
external cause, such as pityriasis, or impetigo of the face, or who
soil their undergarments by urine or fæces, it is important (even
more so than in adults) to correct all disturbances of the digestive
system and to modify the diet.   In very early infancy, if the baby
is at the breast, the nursing should be carefully regulated.   It
should especially be seen to that the infant is not allowed to suckle
too long at one time, as this is usually the cause of vomiting.   If
the infant is on the bottle and a wet-nurse is not secured, sterilized
milk should be advised.   Usually the physician will have to give
minute directions with regard to the preparation of the food and the
quality and proportion of the ingredients which enter into it.   In-
fantile digestive troubles yield much more readily to dietetic meas-
ures than to any remedial treatment.   Until the digestive symptoms
are overcome, treatment of the eczema will usually prove but tem-
porarily successful and relapses will be frequent.

In a child of from two to twelve years the amount of food given
should be only just so much as is necessary.   The little patient
should not be allowed to eat between meals nor to have candy and
sweets and other dainties.   For children especially it is important
to insist on a proper amount of physical exercise and life in the
open air.   Living rooms in which they are kept must be well venti-
lated and exposed to direct sunlight for a good part of the day.
The forbidden articles of diet are the same as for the adult.   I
am not in favor of giving milk as abundantly as is often done.   An
unlimited amount of milk should be prescribed only when it is the
exclusive diet, and it should first be thoroughly sterilized.

Certain remedies have been found of service in the eczema

of childhood. Where the disease is associated with prurigo, ammonium fluoride is frequently useful. It is employed in doses of from 0.02 to 0.05 gramme (gr. ⅓ to ¾) a day, according to the age of the patient. When constipation exists, senna leaves may be prescribed, or prunes may be suggested for dessert. Should the constipation prove obstinate, manna, or calcined magnesia, or rhubarb, should be employed.

In the treatment of the skin affections of children there is much needless and often harmful internal medication. It is the custom to prescribe cod-liver oil, iodide of iron, cinchona tonics, and the like; but nearly all of these so-called remedies further disturb the digestion and so add to the cutaneous irritation. The pale complexion, the pasty countenance, and that tendency to multiple enlargement of the lymphatic glands which has been called lymphatism or the lymphatic diathesis are all consequences of the cutaneous infection and the defective nutrition. Once the diet is regulated, gastric fermentations controlled, and constipation made to disappear, the general health will soon improve and only slight local treatment will be necessary. For this purpose normal nutrition must be re-established and the child's life passed mainly in the light and in the air. Hydrotherapy followed by dry frictions will often prove of much more service as a tonic than any of the tonic drugs.

In acute and extensive eczema in persons who are not dyspeptic, diet is also of great importance. If the eczema is severe and has proved obstinate to treatment, the patient should be put on an absolute milk diet. In milder cases milk should form a large part of the food and the rest of the diet should be as simple as possible. In serious cases the employment of diuretics will often prove of service, and purgation will be useful. During convalescence from eczema alkaline remedies are especially indicated. They should be given freely, and are usually very grateful to patients. Genuine Vichy and the water from Vals in France are often useful.

In subacute or chronic relapsing eczema the indications for treatment are especially to be found in the condition of the urine: in those of a gouty diathesis the salts of lithium, carbonates, benzoates, or salicylates are frequently of great service. For example, a glass or two of the following solution may be taken in the twenty-four hours:

    R Sodii bicarbonat., 10 grammes (℥ iiss) ;
       Lith. carbonat., 2 grammes (℥ ss) ;
       Lith. salicylat., 2 grammes (℥ ss) ;
       Aquæ carbonat., 300 grammes (℥ ix).

Certain of our French mineral waters, as those of Contrexéville or Vitel, are also useful.

Arsenic has been used rather too freely in skin diseases generally. It has no place in the treatment of eczema when the symptoms are acute. It is, however, of distinct value in obstinate forms of the disease and especially in eczema of the hands and feet in which hyperkeratosis becomes a marked feature of the affection. The best forms in which to prescribe the drug is Pearson's solution (twelve drops a day) or Fowler's solution (from six to eight drops a day). Dioscoride granules (from four to six a day) may also be employed. Arsenic treatment must be continued for a long while, and the patient should be constantly under careful surveillance. Its administration must be suspended at the least sign of intolerance to the drug. Puffy eyelids or diarrhœic symptoms are the warning signs.

In the treatment of eczema due to external causes it must once more be insisted on that the essential condition for cure is the removal of the sources of irritation. For example, in eczema of the upper lip the chronic rhinitis which usually accompanies it, but is so often almost latent, needs treatment much more than the eczema which is secondary to it. The same is true of vulvar eczema, which is so frequently secondary to vaginitis and the consequent irritation of the vaginal secretion. Every focus of eczema, no matter how small, should, if possible, be cured without delay. Besnier insists that a single persistent focus may become the point of departure for successive series of eczematous lesions in other parts of the body.

Even more important than the internal treatment of eczema is the external treatment. Before discussing this the interesting question occurs as to whether there ever exists forms of eczema which should be allowed to remain untreated. An impression obtained for a long time among medical men, and prevails popularly even at the present day, that certain skin eruptions—eczema among them —might act as avenues of excretion for certain impurities in the system. The fear of driving in an eruptive process has often pre-

vented the physician from treating such eruptions and has reconciled patients to the discomfort of their continuance. It may be said at once in answer to this impression, that there need not be the slightest fear of producing any internal organic disturbance by the cure of eczema.

At the beginning of acute eczema due to internal causes most of the methods of external treatment are of very little service and may do harm. Ointments, moist applications, and the like, favor the extension of the lesions rather than limit them. This is an observation that has been made by all the authorities. The only method of treatment that seems to do good is the use of a dusting powder. Starch, talcum, and lycopodium powder combined in various proportions is the most useful. Zinc oxide and bismuth subnitrate are suitable rather for local chronic eczema. When the weeping stage has come on more active treatment is allowed.

Whatever the variety of eczema one has to treat, the most important preliminary condition is to put the affected parts in a state of thorough cleanliness. With this in view, all crusts should be removed and measures taken to prevent their recurrence. When the crusts are abundant, they can be removed by means of bran poultices of the exact size of the eczematous parts. These poultices should be left on for several hours. Instead of the poultices, gauze compresses soaked in boiled water may be employed. A small amount of borax and boric acid (about one per cent.) may with advantage be added to the water. When these applications are removed the crusts may be detached by means of absorbent cotton and the parts washed with boiled water.

In generalized eczema there is a temptation to use baths frequently; where diffuse suppurative infection exists there is often an indication for baths; but in ordinary eczema they are, as a rule, contra-indicated. If employed frequently they do harm rather than good. Baths in starch-water are the only ones which should be recommended, and then mainly for reasons of cleanliness and only in chronic eczema, and not oftener than once a week. Among the simplest methods of treatment are moist applications. Boric acid in watery solution (three per cent.) is somewhat irritating to sensitive skins in acute eczema, but the one per cent. solution, especially when combined with equal strength of borax and salicylic acid solutions, is a valuable curative agent. The unctuous

remedies are less thought of than formerly. One of the most useful is fresh lard, which may be employed even in acute eczema and may be renewed every day. Vaseline frequently increases the inflammatory action in the skin. Of late years here in France fatty preparations known under the names of resorbine, aleptine, aseptine, and eudermine have replaced the vaseline with advantage. To these substances as a base zinc oxide may be added in the proportion of ten per cent.

The use of vulcanized caoutchouc has in recent years proved to be a decided advance in the treatment of eczema. A thin layer of caoutchouc of the exact size of the surface of the skin affected by the eczema is applied over the lesions after they have been rendered aseptic. Every two or three hours at first and until the weeping has diminished, and then two or three times a day, the piece of rubber is removed and washed carefully in a boric acid solution, while the skin is washed gently with boiled water. With care as to cleanliness, perfect desquamation of the superficial layers of the skin is obtained and an intense watery secretion follows. By some the use of the caoutchouc is continued until this secretion ceases; by others the employment of a mild solution of silver nitrate is suggested at this point. The caoutchouc treatment is indicated in acute eczema and at the beginning of the treatment of most chronic eczemas that are not seborrhœic in origin. If the rubber produces irritation, or if the slightest sign of suppuration appears, its use should at once be discontinued and moist applications resumed.

In certain cases active treatment of acute eczema when it is of external origin and there is no visceral contra-indication may prove of service. A watery solution of picric acid (1 to 200) used on compresses and renewed every day is a remedy which diminishes very rapidly the œdema and cutaneous hyperæmia of certain acute eczemata. In sensitive patients this proves irritating, however, and it is necessary to watch its effect. This remedy is of use, moreover, only at the beginning of the affection. As soon as it has produced the results indicated the treatment should be modified.

When the symptoms of acute ezema begin to regress, and in most chronic eczemas, zinc oxide is a valuable remedy. It may be used in the form of an ointment or a paste of about twenty per cent. strength, or some one of the following preparations may be employed:

    ℞ Resorcin,
      Zinci oxidi, āā q.s.

or,

    ℞ Olei amygdal. dulc. steril., 10 grammes (℥ iiss) ;
      Zinci oxidi, 20 grammes (℥ v).

or,

    ℞ Talci, 10 grammes (℥ iiss) ;
      Zinci oxidi, 10 grammes (℥ iiss) ;
      Resorcin, 20 grammes (℥ v).

As a rule, however, zinc oxide is used only when there are reasons for not interfering more actively with the course of the eczema. Where patients are directly under the doctor's eye, the use of more active medication is advisable. For instance, salicylic acid (from one to three per cent.), or resorcin (from one to two per cent.), or oil of cade (from one to five per cent.), or lead carbonate (thirty per cent.) are often useful preparations. When there is considerable itching and yet the lesions do not react readily to irritation, a one per cent. solution of carbolic acid can often be employed with benefit.

In old chronic eczemas still more energetic treatment should be employed, and one of the following preparations may be used: oil of cade (ten per cent.), or yellow oxide of mercury and calomel (from two to five per cent.), or pyrogallic acid (from one to three per cent.).

Behrend has shown that in eczemas that do not weep good results may be obtained by light friction over the affected parts. This should be practised with a fine towel impregnated with a small amount of a ten per cent. pyrogallic pomade and rubbed in for a short time night and morning. The following preparation has been found very useful in the service here at the Hospital Saint-Louis :

    ℞ Plumbi oxidi, 10 grammes (℥ iiss) ;
      Olei oliv., 15 grammes (℥ iiiss) ;
      Acid. acet. dil. (vinegar), 30 grammes (℥ vii).

Among the remedies for eczema which act both as reducers of the hypertrophic condition and as active parasiticides must be mentioned silver nitrate in aqueous solution (from one to ten per cent.). It is used most effectively as a spray. It is the least irritant of any of the active remedies, and by using it energetically even the most obstinate of eczemas may be made to yield. A combination

of the treatment by caoutchouc and silver nitrate is often very effective. After the removal of the caoutchouc the surface that has been covered is touched with silver nitrate solution of the strength of about 1 to 40. If, as is usually the case, this produces no inflammatory reaction, the strength of the solution is increased until it is about 1 to 8. After each application of the silver nitrate the cutaneous surface that has been touched is allowed to dry and the caoutchouc is again applied. This method of treatment is suitable even for extensive eczema and also for subacute conditions. It must be remembered that eczema of the hands can always be treated with much more energy than the same affection in other parts of the body. There need be no hesitation in cauterizing affected skin surfaces on the hand either with silver nitrate in saturated solution or with the zinc crayon.

In conclusion, it should be borne in mind that the successful treatment of eczema in almost any form requires great patience and judicious care. The physician must have a variety of remedies at command and must be ready to modify the treatment when he finds any given method unpromising. At the same time each therapeutic method should be given a fair chance to produce the intended effect, as frequent changes of medication may entirely fail of their purpose. Local treatment is important, but the patient's general condition, especially the state of the stomach and bowels, must be carefully regulated.

Medicine

SACCULATED PLEURISY; BRONCHO-PNEUMONIA; ANÆMIA; PERNICIOUS ANÆMIA.

CLINICAL LECTURE DELIVERED AT THE NEW ROOSEVELT HOSPITAL.

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velt Hospital; Professor of the Practice of Medicine in the College of
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SACCULATED PLEURISY.

CASE I.—GENTLEMEN,—This man, aged forty-six years, was ad-
mitted to the hospital fifteen days ago with an old history of syphilis
of eighteen years' standing. Except for that and some dyspnœa on
exertion, he has always been quite strong. Two weeks before enter-
ing the hospital he experienced a sharp pain in the left side, increased
on inspiration and by coughing, together with nausea and vomiting,
and was obliged to stop work and go to bed. There was but little
cough, the expectoration was scanty, and he had neither chill nor
(apparently) fever. The pain continued severe until about two
days before his admission. The patient also complained of tight-
ness in the throat and chest. He entered the hospital with a tem-
perature of 100.2° F., pulse 112, respiration 22. During the last
two days he has felt better.

The symptoms in this case (severe pain in the left side of the
chest, attended by a certain amount of prostration, cough and
scanty expectoration, vomiting, resulting in his being obliged to
go to bed, with, at the end of two weeks or more, a temperature
such as may be seen on the chart) all resemble those of pleurisy
with effusion. The urine has a specific gravity of 1014 and con-
tains a trace of albumin. Over the whole of the left lobe behind

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there are dulness on percussion and diminished respiration. It is very difficult to get satisfactory outlines over the patient's chest. The respiratory murmur is nowhere good. This patient came in with a low temperature, which afterwards suddenly rose to 105° F., and he became very ill; after that the temperature remained at about 104° F. until to-day. The history is not clear; such a run of temperature is not characteristic of pleurisy with effusion. The patient has been losing flesh and is evidently quite ill.

In this case all the symptoms pointed to the presence of fluid, yet aspiration through the lower part of the chest outside the line of the scapula failed to produce it. The trocar was introduced quite deep,—even into the lung,—but no fluid was found. He continued in this state for so long a time that it became more and more probable that the condition was due either to a tuberculous inflammation of the left lung or to a sacculated empyema. The sputum was examined several times for the tubercle-bacilli, but none were found; so the patient has been watched from day to day with the hope of being able definitely to ascertain which of the two exists.

To-day the chest was again punctured in two places: the first puncture produced one hundred and fifty-two cubic centimetres of bloody serum; the second, made directly below the angle of the scapula, resulted in the evacuation of ninety cubic centimetres, and in both instances the fluid was bloody and contained a great deal of fibrin, but no pus. The first puncture was made low down; to-day the puncture was made above that point, between the vertebral column and the spine of the scapula. This point should always be selected when looking for sacculated collections of fluid in the chest: the trocar should penetrate about four inches.

It is evident from this condition of affairs that the patient has had a pleurisy with fluid collected in different cavities, made by adhesions at various points; these cavities are not connected with one another; there may be others containing fluid. The history of this case is by no means that of pleurisy, nor does the fluid obtained resemble that of pleurisy with effusion: it is a bloody serum. The character of the fluid and the history of the temperature lead to the belief that the patient is suffering either from a tubercular pleurisy or a new growth of the pleura, more probably the former.

The above is a fair example of some of the cases which, by

reason of the unsatisfactory character of the symptoms, puzzle one in making a diagnosis. Without the aspirating needle an absolute diagnosis cannot be made, and not even then unless it be introduced in more than one place.

BRONCHO-PNEUMONIA.

CASE II.—The next patient is a colored man, twenty-five years of age, who was admitted to the hospital six days ago. He is said to be temperate in his habits. He states that he has always been well and strong until a short time ago. Three weeks before his admission to the hospital he began to cough and expectorated a large amount of white mucus; he also had a sore throat. Although not in good condition, he continued at work. On the day he entered (without any exposure) he was suddenly taken with a severe chill, accompanied by marked prostration, cough, and a muco-purulent expectoration streaked with blood. He had pains in the lower sternal region, rendered more severe by cough and respiration; his temperature was high (105.4° F.), pulse 140, and respiration 22. His tongue was clean and moist and the arteries normal. The urine had a specific gravity of 1020 and contained a trace of albumin. Over the lower half of the right chest there were dulness on percussion and increased vocal fremitus, but no bronchial breathing. Subcrepitant râles were absent, but there were general râles over both lungs. The heart-sounds were regular. The physical signs consisted of a bronchitis over both lungs in the larger tubes and a consolidation of the left lower lobe. He complained of pain in the chest, and the cough and muco-purulent expectoration continued. His sputum was examined more than once, but no tubercle-bacilli were found, and he soon began to get better. Now, please note the temperature upon the chart: it dropped very rapidly after his entrance and has been running just a little above normal ever since. There is a history of a chill, followed by a rise of temperature, the day before he entered the hospital, but what it was the day previous we do not know. His pulse continues above 100. There is still some dulness over the left lower lobe. The bronchial râles have cleared up.

This case is evidently a complicated one, and as such should be carefully studied. When the patient was admitted the symptoms were those of an ordinary bronchitis, with a broncho-pneumonia

affecting the lower part of the left lung. He may have had first a bronchitis, then a broncho-pneumonia, and it is probable that the inflammation may now be subsiding, although the consolidation does not disappear. Such a condition is possible, and it is to be hoped that it will be so in this case; though even in that event it is difficult to account for the exceedingly high temperature on his admission. Removal of a patient to a hospital will frequently cause a rise of temperature, but in this case it had no effect whatever. The defervescence resembles that of lobar rather than broncho-pneumonia. It is possible that the man had lobar pneumonia with excessive bronchitis. In lobar pneumonia the highest temperature frequently occurs twenty-four hours before defervescence, and this fact may perhaps account for the condition here,— i.e., lobar pneumonia with excessive bronchitis the day before he came in and the day before defervescence, when the temperature ran up and then came down and remained down. But the muco-purulent expectoration still continues, and the temperature is not yet normal, running between 99° and 100° F. This is not characteristic of simple lobar pneumonia.

Another thing which renders the diagnosis difficult is the man's color. The fact should always be borne in mind that a pulmonary lesion occurring in a colored person is apt to be tubercular, especially when it does not clear up promptly. As before noted, this patient's sputum has been examined and no tubercle-bacilli found; unfortunately, however, this does not exclude tuberculosis.

The best thing that can be done for the patient is to give him an abundance of nourishing food. He has improved to a certain extent, but some time must elapse before it can positively be determined whether or not the consolidation will entirely disappear.

ANÆMIA.

CASE III.—Our next patient is a female aged twenty-one years, and has been under observation at the hospital for eleven days, with the following history. Four years ago she was operated upon for an empyema. An incision was made in the right side of the chest, a drainage-tube inserted, pus evacuated, and after an illness of nine weeks she completely recovered. Eight months ago she suffered from dizziness and dyspnœa on exertion, palpitation, and a moderate cough; her appetite became poor and she grew anæmic. Since

then her principal trouble has been the throbbing in her head on exertion. About one month ago the symptoms above noted became intensified, and she also had some pain across the shoulders. When she entered the hospital her skin and mucous membranes were rather pale; but her nutrition was good and has continued so. Her temperature was 98° F., pulse 112, and respiration 40, the two latter being more rapid than the normal. The scar of the old operation in the right chest can plainly be seen. There is some dulness over the lower part of the lung, with somewhat diminished respiration. At the apex there is a systolic murmur. The urine has a specific gravity of 1020 and contains traces of albumin. Examination of the blood gave thirty-four per cent. hæmoglobin and 2,216,000 red blood-cells per cubic millimetre.

This is a case of simple anæmia, and the symptoms, so far as they go, are suggestive of that disease. As regards the head symptoms, she has vertigo, fulness, and throbbing, which are peculiar to anæmia. Some have headache and neuralgic pains over any part of the head. The vertigo may be so marked that the patient can hardly stand up. As regards the breathing, there is a feeling of dyspnœa which really is cardiac in origin, and an increased rapidity in respiration. Often there may be pulmonary symptoms,—a little cough, sometimes laryngeal in character,—a little blood may be coughed up from time to time. The heart symptoms hardly ever fail, although varying in severity in different individuals. In pronounced cases the patients have rapid but insufficient heart action, so that cardiac dyspnœa frequently becomes so great that in getting out of bed they sometimes fall upon the floor. In some patients there may be pain around the heart, fulness, and palpitation, and anæmic girls afflicted with these symptoms are often believed to be suffering from heart-disease. The disturbance in the heart's action is due to the change in the composition of the blood. When there is a heart murmur, it may be in one or two places, or in both, and it is always systolic; it may be heard at the apex or the second intercostal space, or at both places. This murmur does not necessarily indicate disease of the heart, although there is more liability to the latter should the girl be anæmic. When an anæmic patient complains of pain and palpitation about the heart, and has a systolic murmur, the case may be mistaken for endocarditis, particularly when a temporary enlargement of the left ventricle is noted, and it

is well to be on the lookout for this particular error. In regard to the stomach symptoms, this girl had one only,—namely, loss of appetite. There are girls in whom the stomach symptoms are the most prominent, where pain is complained of after eating, and vomiting of food and sometimes of blood in considerable quantity occurs. These are gastric cases of anæmia, and the symptoms depend upon the disease. As regards the intestinal symptoms, there is nothing characteristic except the disposition to constipation, and this is a matter of the greatest consequence, because these patients will not improve if the bowels remain constipated. As regards the kidneys, in a great many girls the urine may have a normal specific gravity and yet contain some albumin and casts. This patient's urine contains both, yet that does not indicate nephritis; it simply means degeneration to a moderate degree.

Between the head, the heart, the stomach, and the kidney symptoms wide sources of error may arise in making a diagnosis; as a matter of fact, such errors are very common. A good rule in these cases is always to examine the blood to find whether or not the patient is anæmic, and, if so, what the character of the anæmia is. That may clear up what otherwise would be an obscure case, and may prevent you from treating her for heart-disease, etc.

The diagnosis and treatment of such cases will either reflect great credit upon the physician or greatly damage his reputation. They are all amenable to treatment, but to only one kind of treatment,—namely, that by sulphate of iron. It makes no difference whether your patient tells you she can or cannot take iron. The quantity to be given is determined by the degree of the anæmia,— from three to ten grains of the sulphate of iron three times a day, according to the severity of the disease. If it should be very pronounced, a little arsenic (one-thirtieth of a grain) should be added. A small amount of rhubarb should also be administered, and if that is not sufficient to keep the bowels open, a simple laxative should be given. In some cases it will be well to add a little codeine to the iron and rhubarb.

Now, an examination of the blood of this patient having shown the case to be an ordinary one, it will not be necessary to administer arsenic. Give her iron. Have made up pills containing three grains of sulphate of iron, one-half of a grain of rhubarb, and, say, one-third of a grain of codeine. One of these pills should be taken

after meals for two or three days. Should there be no action of the bowels at the end of that time, some simple laxative, such as magnesium sulphate, should be given, and the patient directed to get five-grain Blaud's pills, each containing two and a half grains of sulphate of iron, and to take one of these at the same time that she takes the other pill; this will give her about five grains of sulphate of iron three times a day. She now has thirty-four per cent. of hæmoglobin, and consequently is not getting the full dose; she should therefore take still another Blaud pill, which will make about eight grains of sulphate of iron three times a day. That is the only way to give iron to these patients. If the hæmoglobin is down to twenty per cent. or below thirty per cent. I usually place in the pill one-thirtieth of a grain of arsenous acid. In the blood of such a person the hæmoglobin should be noted and the red blood-cells counted and their size and shape studied: one does not want to be caught unawares with a case of pernicious anæmia. As regards the diet, that depends upon the gastric symptoms. If the stomach is in bad condition, with vomiting and pain, the patient should be placed upon medicated milk,—i.e., milk containing cerium oxalate and sodium bicarbonate. If there are no gastric symptoms, she can eat meat, vegetables, etc. As a rule, the stomach does not require treatment.

This patient came to the hospital on November 29. On the 30th there were thirty-four per cent. hæmoglobin and 2,216,000 red blood-cells per cubic millimetre. On December 10 the hæmoblobin was sixty-four per cent. and the red blood-cells numbered 3,840,000. There is marked improvement, and I think she can bear a little more iron, which will enable her to get out of the hospital earlier. She has been given six grains of sulphate of iron, one-fifth of a grain of rhubarb, and one-twentieth of a grain of arsenous acid during the first eleven days, and has been doing very well. This treatment will be persevered in until the hæmoglobin equals ninety per cent. When it reaches that point she will be sent out of the hospital after giving her a prescription for Blaud's pill. As a precautionary measure she should take these pills on and off for the next two years, as the blood, after regaining its normal condition, will again deteriorate unless iron be continued for a considerable length of time.

PERNICIOUS ANÆMIA.

CASE IV.—Up to the time of the onset of her present illness our next patient, aged twenty-eight years, has always been strong and healthy. For the last fourteen months she has complained of malaise, loss of appetite, attacks of nausea and vomiting, and yellow skin. Seven months ago she had dyspnœa on exertion, palpitation, headaches, and neuralgic pains over different parts of the body. The gastric symptoms continued and she lost weight. Her bowels were constipated and menstruation ceased. Her chief complaint is weakness. When she entered the hospital her color was "dead" yellow, temperature 99° F., pulse 104, and respiration 16. The urine showed a specific gravity of 1026 and contained traces of albumin. There was a soft systolic murmur at the apex of the heart. The hæmoglobin was thirty-eight per cent., and the red blood-cells numbered 2,728,000.

In this case the blood is apparently in better condition than in the preceding one, yet on noting the appearance of the red blood-cells, a variation in their size and shape is shown which belongs to pernicious anæmia only. These two cases are very valuable in that they serve to illustrate the great differences existing between simple and pernicious anæmia. Here are two women of nearly the same age, and yet the one whose blood is apparently the better has the worst form of anæmia.

This patient was placed upon the same treatment as Case III., but the results have been very different, as may be seen by consulting the chart. The hæmoglobin has fallen to thirty-one per cent. and the red blood-cells number 1,376,000. She has gotten worse instead of better.

These cases of pernicious anæmia are susceptible of great improvement, but we are handicapped in their treatment by what is called the "natural rise and fall in the hæmoglobin and blood-cells." The administration of all remedial agents should occasionally be stopped, as improvement may follow their withdrawal, as was seen early in the season in an old woman who presented a much worse case of pernicious anæmia than does this patient. She soon got tired of treatment, and finally stopped it altogether; soon after which her red blood-cells began to increase in number and kept on increasing until she left the hospital.

REPORT ON ONE HUNDRED CASES OF AORTIC ANEU-RISM, WITH DETAILS OF THREE CASES OF ANEU-RISM OF THE BASILAR ARTERY.

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THIS report was originally undertaken in order to obtain more precise details as to the position of aneurisms occurring in the aorta and, if possible, definitely to establish the situation of the aneurism in the arch as judged from that of the tumor formed or the pulsation present. It was thought desirable, however, to make a more complete analysis of various other points, more especially with reference to those cases which could be examined in the post-mortem room. The one hundred cases analyzed include forty-seven examined post mortem and fifty-three discharged from the hospital benefited.

Etiology (*Analysis of One Hundred Cases*).—Excessive *alcoholism* was acknowledged in twenty-nine, moderate alcoholism in forty-six, in two only was there a positive denial of either the moderate or excessive use of alcohol, and in the rest of the cases no observations were made. Definite *syphilis* was noted in thirty-seven cases, the interval elapsing before the onset of symptoms ranging from six to thirty-five years (the average interval in five recorded cases was twenty-three years); a doubtful history of syphilis was obtained in fifteen cases, and there was no history at all in thirty cases. In forty cases there was a history of *severe strain* acting as an exciting cause. Symptoms arose after a blow on the chest in six cases and after a severe fall in five. No definite account could be obtained of the exact position of the blows sustained. *Rheumatic fever* had been present at some time in sixteen cases and was denied in fourteen. A history of *gout* was obtainable in nine cases and was denied in eleven. Definite *plumbism* taking the form of colic was met with in two cases. *Arterial disease* in the

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parents, as shown by deaths from cerebral hemorrhage, was noted in nine cases.

In thirty-six cases the *occupation* had been light, in fifty-seven laborious. The former included housewife in six, painter in six, seamstress in three, clerk in three, inspector in two, shoemaker in two, and there were single cases of the following occupations: draper, cook, steward, publican, butler, waiter, French-polisher, nurse, piano-tuner, horse-dealer, house-painter, army officer, shop assistant, mining manager. Among the cases of laborious occupation, seven occurred in soldiers, five in bricklayers, six in carmen, four in engineers, two in sailors, three in porters, seven in laborers, three in carpenters, three in grooms, two in blacksmiths' strikers, and there were single cases of the following occupations: plasterer, stoker, athlete, tanner, acrobat, cabman, plumber, blacksmith, bus-driver, boiler-maker, charwoman, gardener, portmanteau-maker, chair-maker, potman. In eleven cases there was no history of alcoholism, syphilis, or strain, including under the latter a blow or fall.

Alcoholism, syphilis, and strain were present in twenty-three cases, alcoholism and syphilis in eleven, syphilis and strain in nine, alcoholism and strain in twenty-four, syphilis only in five, alcoholism in eleven, and strain only in six. In seven out of the twelve women there was a history suggestive of syphilis; in the rest, as is so often the case in women, a clear history could not be obtained.

Sex.—Eighty-eight cases occurred in men and twelve in women.

Age and Duration.—The average age at the onset of symptoms was forty-three and one-half years. The maximum was sixty-eight years, the minimum (in a case of aneurism of the descending thoracic aorta) twenty-seven years. The age of the patient with aneurism of the sinuses of Valsalva was twenty-one years. The symptoms had lasted as long as five and one-half years in one fatal case and nine years in one of those reported as relieved when discharged.

Number of Aneurisms.—But one aneurism was found in forty-one of the forty-seven cases, and two separate aneurisms in six cases. One aneurism only was present in fifty-one of the fifty-three cases. Two aneurisms were present in two cases. In another a popliteal aneurism had been removed by operation, but another appeared later in the ascending thoracic aorta, and still another in the abdominal aorta.

Position of the Aneurisms.—In this analysis the nomenclature adopted for the various parts of the aorta is (1) Ascending Thoracic Aorta, (2) Arch of the Aorta, (3) Descending Thoracic Aorta, and (4) Abdominal Aorta.

The nature of the aneurisms in the forty-seven fatal cases was as follows: (single) ascending thoracic aorta six, arch nine, upper part of descending thoracic aorta twelve, lower part one, abdominal four, involving ascending thoracic aorta and arch three, dissecting two, sinuses of Valsalva (aortic valves) one, marked aneurismal dilatation of ascending thoracic aorta one, aneurismal dilatation of arch one; (double) ascending thoracic and upper descending thoracic aorta two, arch and innominate artery one, ascending thoracic and lower descending thoracic aorta one, ascending thoracic aorta and innominate one, arch in two places one, abdominal aorta one. Two of the above are described as aneurismal dilatations rather than aneurisms, because, though the dilatation was practically saccular, no clots were found post mortem in the interior of the aneurism.

The separate parts of the aorta were involved thus: ascending thoracic aorta fourteen times, the average age of the patients being forty-three years; arch fifteen times, the average age being fifty-one years; descending thoracic aorta (upper fourteen times, lower one time), the average age being forty-two and one-half years; abdominal five times, the average age being forty-two years; innominate two times, the average age being forty-three years. (In this analysis the " average age" is the age at onset of symptoms.)

Of the five fatal cases of aneurism in women, four were in the arch and one was a dissecting aneurism occurring in a subject forty-three years of age, and involving the ascending thoracic, the arch, and the descending thoracic aorta.

Probable Position (Clinical) of the Aneurisms.—In the fifty-three cases which were relieved the position of the aneurisms was as follows: (single) ascending thoracic aorta nineteen, arch twenty, upper descending thoracic aorta one, abdominal eight, ascending thoracic aorta and innominate two, ascending thoracic aorta and arch one; (double) ascending thoracic aorta and innominate one; (treble) ascending thoracic aorta, abdominal and popliteal one.

Of seven cases of aneurism occurring in women, four were in the ascending thoracic aorta, two in the arch, and one in the ascending thoracic aorta and arch.

1. ASSOCIATION OF ANEURISM OF THE AORTA WITH INVOLVEMENT
OF AIR-PASSAGES, ETC., RESULTING IN ALTERATION
OF VOICE, HARSH COUGH, OR METALLIC OR
"BRASSY COUGH."

Of the forty-seven cases, six involved the ascending thoracic aorta, harsh cough occurred in two, metallic cough in two, and the voice was altered in character in one only. In nine cases affecting the arch, metallic cough occurred in two, the voice was altered in two, and stridor was present in one. In thirteen cases implicating the descending thoracic aorta, harsh cough was present in five and stridor in one. In three cases involving the ascending thoracic aorta and arch, metallic cough occurred in one, the voice was affected in one, and in one there was an aneurism of the arch and of the innominate artery, with metallic cough.

Of the fifty-three cases, nineteen involved the ascending thoracic aorta, harsh cough being present in one, metallic cough in two, and the voice altered in three. In twenty cases implicating the arch, metallic cough was heard in eight, the voice was altered in nine, and there was stridor in one.

2. OCCURRENCE OF ENLARGED VEINS IN THE NECK AND TRUNK,
ŒDEMA, AND CYANOSIS IN FORTY-SEVEN CASES, OF WHICH
TWENTY-TWO WERE SPECIALLY OBSERVED.

Cases.	Nature of Aneurism.	Enlargement of Veins.	Cyanosis.	Œdema.
6	Ascending thoracic aorta.	4	4	. .
7	Arch	6	3	1
6	Descending thoracic aorta	4	1	. .
3	Ascending thoracic aorta and arch . . .	3	2	2
22		17	10	3

Of the fifty-three cases, thirty were specially observed, as follows:

Cases.	Nature of Aneurism.	Enlargement of Veins.	Cyanosis.	Œdema.
11	Ascending thoracic aorta.	10	2	1
16	Arch	8	1	1
1	Ascending thoracic aorta and arch . . .	1	1	. .
2	Ascending thoracic aorta and innominate	2	. .	. .
30		21	4	2

Thus, enlargement of veins was noted in thirty-eight of the fifty-three cases, cyanosis in fourteen, and œdema in five only.

Of the forty-seven cases examined post mortem, distention of the veins of the neck or trunk was found associated with obvious obliteration or narrowing of the larger veins at the root of the neck and in the upper thorax in but nine,—namely, in three cases involving the ascending thoracic aorta and arch, in three cases of aneurism of the ascending thoracic aorta, and one in each of the following: aneurism of the arch, of the descending thoracic aorta, and of the ascending thoracic aorta and innominate. This shows that in a large proportion of the cases specially observed—*i.e.,* in eight out of seventeen—enlargement of the veins of the neck and chest occurred without the presence of any coarse obstruction to account for it.

3. DETAILS OF PUPIL CHANGES, UNILATERAL SWEATING, NARROWING OF THE PALPEBRAL FISSURE, ETC.

The information under this heading is somewhat scanty.

Of the forty-seven cases, reaction of the pupils was carefully noted in thirteen. In twelve the reaction was quite normal; in the remaining case the reaction was abnormal, but there had been some antecedent damage to the eye.

Of the fifty-three cases, special attention had been given to the pupil reaction in twenty-nine, and the pupils reacted quite normally in all. Unilateral sweating of the face was observed in but four cases: one patient died of aneurism of the ascending aorta, and had sweating of the right face; of the other three (not fatal), one suffered from an aneurism of the arch with flushing of the right face associated with increased moisture on that side, and in the remaining two cases no sweating or moisture was observed.

Of the forty-seven cases, four involving the ascending aorta were specially examined: in one case the pupils were equal, in two the right was greater than the left, and in one the left was greater than the right. In two cases carefully observed, narrowing of the palpebral fissure occurred on the left side in one and on the right side in the other. In five cases examined for equality of the pulses, the right was greater than the left in one, the left than the right in four, and the left was obliterated in one. Three cases were examined for delay, which occurred in the right pulse once, in the left once, and was not present in the third. Six cases of aneurism of the arch of the aorta were examined for equality of pupils. In

three cases the pupils were equal, in two the left was greater than the right, and in one the right was greater than the left. One observation was made for narrowing of the palpebral fissure, and this was found on the left side. Nine cases were observed for equality of pulse: the pulses were equal in two, the right was greater than the left in four, and the left than the right in three. The right pulse was entirely obliterated in one case, the left in another. Delay was looked for in two cases and found in neither. Six cases of aneurism of the descending thoracic aorta were observed: the left pupil was greater than the right in three and the pupils were equal in the remaining three. In three cases observed, the right pulse was greater than the left in one and the pulses were equal in two cases. In one case of aneurism of the ascending aorta and arch the right pupil was greater than the left. In three cases observed for inequality of pulse, the right was greater than the left in one, the left than the right in two, and in one case the right pulse was obliterated. There was no delay in one case observed. In one case of aneurism of the ascending aorta and innominate artery the right pupil was found to be larger than the left, the right pulse greater than the left, and the left pulse was delayed compared with the right. In one case of aneurism of the ascending aorta sweating was noticed on the right side of the face, there was narrowing of the left palpebral fissure (? widening of the right), and the left pupil was larger than the right.

Of the fifty-three cases, thirty-five were specially observed for size of pupils: the pupils were equal in twenty-seven, the left was greater than the right in five, and the right than the left in three. In five cases ptosis was carefully looked for; this occurred in two on the left side and was absent in the other three. Forty-three cases were particularly observed with respect to fibrosis of the radial arteries: in thirty-four the artery was fibroid, in nine it was normal. Thirty-one cases were examined specially for equality of pulses: in seven the right was greater than the left, the left than the right in eight, and the pulses were equal in sixteen. In one case the right radial artery was obliterated. Seventeen cases were examined for delay; this occurred in the right pulse once and in the left four times; in the remaining twelve there was no delay.

Of the fifty-three cases, thirteen of aneurism of the ascending aorta were observed for size of pupil, etc. In nine the pupils were

equal, in three the left pupil was larger than the right, and in one the right was larger than the left; ptosis was not seen in four cases specially examined. In fifteen cases of aneurism of the ascending aorta the right pulse was greater than the left in three, the left than the right in seven, and they were equal in five; in one case the right was obliterated. Seven cases were observed for delay, which was found in the right once, in the left once, and was absent in the remaining five. Nineteen cases of aneurism of the arch were specially observed: in fifteen the pupils were equal, in two the left was greater than the right, and in two the right than the left. In fourteen cases of aneurism of the arch the right pulse was greater than the left in four, the left than the right in one, and the pulses were equal in nine. Nine cases were studied to detect delay; in three it was present in the left pulse, in six it was absent. In two cases of aneurism implicating the ascending aorta and arch the pupils were equal and no delay was noted in the left or right pulse. In a case involving the ascending aorta and innominate artery the pupils were equal and the radial pulses equal and synchronous.

In the forty-seven cases in which autopsy took place a minute analysis has been made in other points referring to the symptoms.

(*a*) *Displacement of the Heart's Apex Beat.*—In only two cases of the forty-seven was the maximum impulse displaced independent of valvular disease or fibrosis of the kidney. The cause, however, of the displacement in these two cases was the large size of the aneurism, which forced the heart out of place and so accounted for the abnormal position of the apex beat.

(*b*) *Thrill* was recorded in but two cases: in one there was an aneurismal dilatation of the ascending thoracic aorta without any clot formation; in the other the aneurism involved both the ascending thoracic aorta and the arch.

(*c*) *Systolic murmurs* heard over the aneurisms, independent of valvular disease, were observed in eight cases,—namely, in one of aneurism of the arch, in four of abdominal aneurism, in two of aneurism of the ascending thoracic aorta and arch, and in one of an aneurism involving the ascending thoracic aorta and innominate artery.

(*d*) *Dulness on percussion* was observed in thirty out of the forty-seven cases,—namely, ascending thoracic aorta four out of six cases, arch four out of nine, descending thoracic aorta ten out of

thirteen, abdominal aorta four out of four, ascending thoracic aorta and arch two out of three, and dissecting aneurism involving the lower descending thoracic aorta one out of two cases. Dulness was also noted in each of the following five cases: marked aneurismal dilatation of ascending thoracic aorta and arch of the aorta; double aneurism of the arch and the innominate artery; of the ascending thoracic aorta; of the ascending thoracic aorta and arch; and descending thoracic aorta.

(e) *Expansibility* of the tumor was noted in sixteen of the forty-seven cases. Thus: ascending thoracic aorta three out of six cases, arch three out of nine, descending thoracic aorta two out of thirteen, abdominal aorta four out of four, and ascending thoracic aorta and arch two out of three cases. Expansibility was also noted in a case of marked aneurismal dilatation of the arch and in one of aneurism involving the arch and the innominate artery.

(f) *Diastolic shock* was noted in four cases, in three of which the ascending aorta was involved and in one the aneurism occurred in the descending thoracic aorta.

(g) A *tumor* was found in eighteen out of the thirty-eight cases specially observed, as follows: In six cases of aneurism of the ascending thoracic aorta, tumor was present in three, in each case to the right of the sternum; in nine cases of aneurism of the arch, tumor was present in three, one to the right and left of and beneath the sternum, one under the sternum, and one pointing at the left back on a level with the first and second dorsal vertebræ; in thirteen cases of aneurism of the descending thoracic aorta, tumor was present in two, one pointing to the left and right of the spine from the third to the eighth dorsal vertebra, and one between the left scapula and the spine; in four cases of aneurism of the abdominal aorta, tumor was present in four, two pointed in the epigastrium, one in the right loin, and one caused a swelling reaching from the sixth right rib to half-way between the xiphisternum and the umbilicus; in three cases of aneurism of the ascending aorta and arch, tumor was present in three, one to the left of the sternum and under it, and two to the right of the sternum; in two cases of dissecting aneurisms, tumor was present in one, pointing at the left chest, behind; in one case of aneurisms of the arch and the innominate artery, a tumor was present under the right sterno-mastoid; in one case of aneurisms of the ascending thoracic aorta and the innomi-

nate artery, a tumor presented in the first and second intercostal spaces of the right side.

(*h*) *Pulsation.*—In six cases of aneurism of the ascending aorta, pulsation was present in four; in all four cases it was to the right of the sternum. In nine cases of aneurism of the arch, pulsation was observed in five: in two of these it was present over the sternum and on either side, in one to the right of the sternum, in one to the left, and in one the pulsation occurred at the back of the chest on the left side. In thirteen cases of aneurism involving the descending thoracic aorta, pulsation was met with in six, to the *right* in one case (the pulsating area was also dull to percussion; the aneurism, however, pointed towards the back of the chest, producing a tumor in the dorsal region, and could not have directly caused the pulsation to the right of the sternum), in the left back in the dorsal region in one, in the left lumbar region behind in two, under the left clavicle in one, and involving the whole left chest in one case. Pulsation occurred in all four of the abdominal aneurisms agreeing in position with that of the tumors formed, already tabulated. In three cases of aneurism involving the ascending thoracic aorta and the arch, pulsation was seen under the manubrium and in the *second left* intercostal space in one, in the first, second, and third right intercostal spaces in one, and from the second to the sixth right intercostal space in the third case. In two cases of dissecting aneurism, pulsation occurred to the right of the sternum in one. In a case of marked dilatation of the ascending aorta and part of the arch, pulsation was observed in the first right intercostal space and in the first, second, and third left intercostal spaces; and in one of marked dilatation of the arch of the aorta, it was seen in the first right intercostal space.

In four cases of double aneurism, pulsation was observed under the manubrium sterni, right sterno-clavicular articulation, and first right space, where the aneurisms involved the arch and innominate; in the first and second intercostal spaces of the right and left sides in aneurisms of the ascending thoracic aorta and upper descending thoracic aorta; in the right mammary region and second and third right intercostal spaces where the aneurism involved the ascending thoracic aorta and the lower part of the descending thoracic aorta; and in one case of aneurisms of the ascending thoracic aorta and innominate artery the pulsation was seen in the inner end of

the *first left* intercostal space. Pulsation was thus observed in twenty-nine cases out of the forty-seven.

(*i*) *Pressure on Adjacent Structures.*—Of the six cases of aneurism of the ascending aorta, pressure occurred on the *left* bronchus in one, on the trachea in two, on the œsophagus in one, and on adjacent veins in three. Of nine aneurisms of the arch, four pressed on the left bronchus, one on the right bronchus, three on the trachea, and one on the veins. Of twelve aneurisms of the descending thoracic aorta, six pressed on the left bronchus, two on the right bronchus, one on the œsophagus, and one on the veins. Of the six cases of aneurism of the ascending thoracic aorta and arch, one pressed on the right bronchus, two on the trachea, and three on the veins. Of the two cases of double aneurism involving the ascending thoracic aorta and upper descending thoracic aorta, one pressed on the trachea. The trachea was also pressed upon in a case of double aneurism involving the arch and innominate artery. One case involving the ascending thoracic arch and innominate artery pressed upon the veins.

On adding these totals, it will be seen that pressure occurred on the left bronchus eleven times, the right bronchus four times, the trachea nine times, the œsophagus twice, and the veins nine times.

(*j*) *Radiation of Pain.*—In the six cases of aneurism of the ascending thoracic aorta, pain was present in the right arm in three, in the chest generally in one, between the shoulders and in the right chest in one, and was absent in one case. In the nine cases of aneurism of the arch, pain was present in the chest generally in four, in the right arm in one, in the left arm in three, and was absent in one case. In the thirteen cases of aneurism of the descending thoracic aorta, pain was present in the left chest in six, in the back generally in five, in the abdomen in one, and was absent in one case. In the four cases of aneurism of the abdominal aorta, pain was present in the right abdomen in one, in the right knee, thigh, and scrotum in one, in the left flank in one, and in the epigastrium, accompanied by a girdle sensation, in one case. (The pain in these four cases was relieved by pressure.) In the three cases of aneurism of the ascending aorta, pain was present over the right chest in one, across the chest and in both arms, especially the left, in one, and was absent in one case. In the two cases of dissecting aneurism, pain was present in the left chest for four months

in one, and in the middle of the chest, epigastrium, and left abdomen in one case. In a case of marked aneurismal dilatation of the ascending aorta, pain was present over the whole chest and was anginal in character. In a case of marked aneurismal dilatation of the arch, pain was present in the right chest and down both arms. In two cases of double aneurism of the ascending thoracic aorta and upper descending thoracic aorta, the pain was in the left chest in one and between the shoulders in the other. In a case of double aneurism involving the arch and innominate artery, the pain reached the right ear and down the right arm. In a case of double aneurism of the ascending thoracic aorta and lower part of the descending thoracic aorta, the pain occurred in the right mammary region and in the right arm. In a case of double aneurism involving the ascending aorta and the innominate artery, pain was present in the right chest and right arm. (Pain occurred in forty of the forty-seven cases.)

(*k*) *Hæmoptysis.*—Hæmoptysis was present in thirteen of the forty-seven cases, occurring four times in aneurism of the descending thoracic aorta, four times in aneurism of the arch, once in aneurism of the arch and innominate, once in aneurism of the ascending aorta, twice in aneurism of the abdominal aorta, and once in a case of dissecting aneurism. In six cases bleeding occurred at death, in three internally,—*i.e.,* in two abdominal aneurisms and one dissecting aneurism,—in two with fatal hæmoptysis in cases of aneurism of the descending thoracic aorta, and in one slightly in a case of aneurism of the arch and innominate artery.

(*l*) *Associated Valvular Disease.*—This was recorded in ten of the forty-seven cases.

In the analysis of the one hundred aortic aneurisms, several points of particular interest are shown. The relative proportion of males and females is the same as usually described,—namely, about seven or eight of the former to one of the latter. The seat of the aneurism as verified by autopsy is, however, somewhat at variance with the position given by various writers, especially Hayden. Of the cases analyzed by the latter, aneurism of the ascending aorta is by far the most common. In the forty-seven cases reported above, the usual seat was in the descending thoracic aorta,—thirteen out of forty-seven cases,—aneurism of the ascending aorta occurring in

only six cases. However, if its frequency in the various parts of the aorta be compared, including cases of double aneurism and those in which the single aneurism involves more than one part, it will be seen that it occurs in about the same frequency in the ascending thoracic aorta, the arch, and the descending thoracic aorta. If clinical evidence alone is taken into consideration, the aneurism appears to be far more common in the ascending thoracic aorta and arch than in the descending thoracic aorta, but this is readily explained by the difficulty in diagnosing it in the last-named position. It is also interesting to note how much more frequently aneurism of the abdominal aorta was diagnosed in the fifty-three cases (nine times) than it was established in the forty-seven which were examined post mortem (five times).

As to the etiology, the combination of alcoholism and strain is more frequently met with in the one hundred cases than any other. Aneurism of the arch seems to have a better prognosis than elsewhere, for the average age at death is higher than in other cases. Aneurisms of the descending thoracic aorta and abdominal aorta are fatal at an earlier period than when occurring in any other position. Sir Thomas Barlow has called attention to the great frequency of syphilis as a factor in the aneurisms occurring in women: in this series syphilis was present in more than half the cases.

The rarity of œdema of the neck and upper chest is confirmed, notwithstanding the frequent occurrence of enlarged veins. As a rule, the aneurisms did not completely block veins in their neighborhood; where this had taken place, the process must have been so gradual that collateral circulation had been freely established. Nearly half the cases with enlarged veins of the neck and upper chest showed no gross obstruction of the larger veins within the chest.

Finally, dulness on percussion was present in less than half the cases of aneurism of the arch and in two-thirds of those of the ascending aorta. In the four cases of abdominal aneurism there were dulness on percussion and a definite tumor. Tumor was present in a little less than half of all the cases in which special observation was made. In one case of suspected abdominal aneurism there was marked pulsation in the epigastrium, with expansibility, and a loud systolic murmur over the maximum pulsation; this murmur was also heard quite distinctly over the lower dorsal and upper

lumbar spines; no tumor, however, could be defined in the epigastrium, and at the autopsy the abdominal aorta was found free from an aneurism, but markedly atheromatous. Tumor was present in only one-third of the total number of cases of aneurism of the arch of the aorta and in one-half of those of the ascending aorta. The left bronchus was found compressed in eleven, the trachea in nine, and the right bronchus in four cases.

As stated above, hæmoptysis was present in thirteen of the forty-seven fatal cases; in the fifty-three cases relieved, hæmoptysis was recorded in but six, making a total of nineteen in one hundred cases. Hæmatemesis was recorded in one case diagnosed as abdominal aneurism; this case, however, was not examined post mortem.

4. DETAILS OF THREE FATAL CASES OF ANEURISM OF THE BASILAR ARTERY.

CASE I.—H. C., aged twenty-five years; shop assistant.—This patient had had syphilis three years previously and had been treated continuously for eight months. For nine months before admission he had suffered from suboccipital headache, and there was a history of more or less headache for three years. Seven days before death he had had a fit which lasted ten minutes, during which time his breathing was loud, stertorous, and slow, with very rapid pulse; there was some weakness of the left facial muscles and the left knee-jerk was absent; the pupils were small and equal. The grasp of the left hand was weaker than that of the right. The day following he was sick four times and the urine was albuminous.

Three days after the fit the temperature was normal; headache was localized to two areas,—the cortex and the occipital region, especially the latter,—and was increased by the upright posture. Slight stiffness was present in the neck muscles. The mental condition was quite clear. There was retention of urine for a few hours and then the patient relieved himself spontaneously. The optic disks were normal and the sight was good; the pupils reacted to light and accommodation. The cranial nerves were unaffected; there was no weakness or rigidity of the limbs; the knee-jerks were present and equal; no clonus observed; sensation perfect. Six days after the initial fit another occurred suddenly, just as the patient sat up in bed; he became unconscious and did not struggle, nor was there any incontinence of urine or fæces; the lower jaw

dropped and the breathing became slow and stertorous; the pulse was so rapid that it could not be counted. The pupils were equal, very small, and without reaction to light; conjunctival reflex was absent. Both knee-jerks were absent and the limbs were flaccid. Ten minutes after the onset the rectal temperature was 100.4° F. The patient recovered in half an hour, but was restless during the night and complained of pain and stiffness of the neck. The difficulty in micturition was again present and there was slight albuminuria. There was no optic neuritis. The following day a similar fit occurred, the rectal temperature reaching 102.2° F. Some few hours after the fit the mental condition of the patient was found to be defective; he was also very talkative, and complained of suboccipital pain; speech was slightly slurred and the memory bad. The pupils reacted sluggishly to light and the knee-jerks were absent; no ankle clonus. A fourth and last fit occurred, and the patient died suddenly of respiratory failure.

Post-Mortem Examination.—A thin layer of blood was found under the dura mater of the right parietal region, with much blood effused around the base of the brain bulb and in the spinal cord. An aneurism (ruptured) was found about the middle of the length of the basilar artery, surrounded by clot lying under the arachnoid membrane and extending round the medulla to the fourth ventricle. There was no blood in the third ventricle, and the brain substance was not torn up by the effused blood.

CASE II.—J. K., housewife.—The patient had been married about seven years, and had had a miscarriage five years ago; there were no other pregnancies; there was no history of excessive alcoholism. Sixteen days before death the patient felt ill and faint whilst hanging out some clothes, and on going indoors she fell down six steps, but without cutting or bruising her head. She felt pain in her back and legs as a result of the fall, and, on being lifted up, her legs were so weak that she could not stand or walk; she did not lose consciousness. She was put to bed and slowly improved for ten days, when she suddenly lost consciousness and never completely regained it; retention of urine persisted till death. The pupils varied: at one time they were equal and rather large, at another the right pupil was smaller than the left, and just before death both pupils were enlarged. There was no paralysis of the external eye muscles. There was some weakness of the right tongue and right

face. The knee-jerks were equal and a little increased; towards the end they were entirely lost. There was no sensory impairment, no rigidity of the legs, slight rigidity of the arms, and the muscles of the back and neck were very rigid. There was no optic neuritis but the fundi of the eyes were hyperæmic. The temperature varied, being 101.2°, 103°, 106°, and just after death 110.2° F. The pulse was rapid. There was considerable conjunctivitis of the right eye towards the end (? trophic), and a day before death there was herpes of the lips and nose.

Post-Mortem Examination.—A saccular aneurism as big as a small pea was found at the end of the basilar artery, bound down by pia mater enclosing nerves going to the left cavernous sinus. No signs of meningitis or hemorrhage. The aneurism had not ruptured. There was a doubtful aneurism of one of the anterior perforating arteries.

CASE III.—G. S., aged twenty-nine years, formerly a soldier.— He had had syphilis, but had never been treated for it; there was a history of excessive indulgence in alcohol. A fortnight before death the patient had complained of occipital headache and stiffness of the muscles at the back of the neck.

On the morning of the day before his death he was sick and his headache was worse. Twenty-four hours later he became suddenly unconscious; when examined, his pulse was found to be very irregular and rather full. The reflexes, including the jaw-jerk and excluding the wrist-jerk and ankle clonus, were greatly increased, latterly the knee-jerks were absent; there was no incontinence; there was occasional retraction of the head and neck; the patient lay in bed mostly on the side and curled up, and was inclined to rotate himself to the right. Besides the rigidity of the neck, the legs and arms were stiff, and towards the end priapism was very marked. The pupils were equal and of natural size and reacted to light and the neck stimulus; there was no nystagmus, but almost constant deviation of the eyes to the right. The patient could just be roused; he was very restless and was kept in bed with the greatest difficulty. The urine was drawn off by catheter, was free from albumin, neutral, precipitated phosphate on boiling, and reduced Fehling's solution, though no reaction like that of sugar could be obtained with caustic potash and picric acid.

Post-Mortem Examination.—The heart and lungs were normal,

and there were diffuse gummatous formations in the liver with much scarring. A ruptured fusiform aneurism of the basilar artery was found, and blood was effused over the base of the brain as far forward as the optic chiasma, under the left temporo-sphenoidal lobe, in the fourth ventricle, the aqueduct of Sylvius, the third and the lateral ventricles, and around the cerebellum.

The above records of one hundred cases of aneurisms of the aorta and three cases of aneurisms of the basilar artery have been obtained from the case-books of University College Hospital. No choice of the cases has been made; all have been recorded which have occurred during the last sixteen years.

I am indebted to my colleagues of University College Hospital for their courtesy in allowing me to make use of the case-books.

THE NORMAL TEMPERATURE RANGE.

BY DR. MARX,

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GENTLEMEN,—Now that the state of the temperature has become so important in the diagnosis of many diseases, it is essential to know definitely the exact limits of the normal temperature. In incipient tuberculosis, a slight rise above the normal is often the first objective symptom of the disease. In incipient typhoid fever, after two or three days of discomfort, the first suspicious symptom indicating the existence of the pathological condition is a slight morning rise of temperature. A variation of less than a degree in a patient's temperature may possess important symptomatic significance. It is therefore necessary that especially the upper limit of normal temperature shall be determined with absolute accuracy.

Wunderlich's tables have hitherto been accepted as representative of normal and abnormal temperature. His observations were made with the thermometer in the axilla, and he devised the following schedule:

First, subnormal, or collapse temperatures, under 36° C. (96.8° F.). Of this lower temperature there are two classes: (a) deep fatal algid collapse, under 33° C. (91.4° F.), and (b) simple algid collapse, from 33.5° to 35° C. (92.3° to 95° F.). These temperatures represent a condition in which the patient is in great danger, but in which there is still the possibility of complete recovery. Cases of moderate collapse—from 35° to 36° C. (95° to 96.8° F.)—are usually devoid of danger.

Second, normal and practically normal temperatures: (a) subnormal, from 36° to 36.5° C. (96.8° to 97.7° F.); (b) absolutely normal, from 36.6° to 37.4° C. (97.9° to 99.3° F.); and (c) subfebrile, from 37.5° to 38° C. (99.3° to 100.4° F.). This table has found its way into most of the text-books and medical com-

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pendiums which serve to introduce the student to a practical knowl-
edge of medicine. Other authorities usually give the normal tem-
perature somewhat lower than this. Guttmann, for instance, con-
siders that the limits lie between 37° and 37.2° C. (98.6° and
98.9° F.); Hagen gave them as from 36.25° to 37.5° C. (97.25°
to 99.5° F.); while Vierordt accepted the temperature limits as
set down by Hagen. Klemperer, who is one of the most recent
authorities, makes a compromise between the views of Wunderlich
and some of the other older clinical observers and the modern obser-
vations on temperature. He says that the temperature of the normal
individual, taken in the axilla, is between 36.5° and 37.5° C.
(97.7° and 99.5° F.).

As the upper limit of normal temperature is so important in
modern diagnosis, I made a series of observations in two hundred
cases some two years ago, under the direction of Professor Brueger,
in the Institute for Infectious Diseases here at the Charité Hospital.
These cases comprised two classes, the first class consisting of one
hundred patients who were suffering from non-febrile diseases—
as, for instance, pure uncomplicated tuberculosis of the lungs—
or who had recently passed through febrile diseases, but were well
beyond the stage of convalescence, so that there was no question
of the occurrence of any febrile movement. The second class em-
braced one hundred patients who were under treatment for syphilis,
gonorrhœa, or soft chancre. In all of these cases no sign of fever
could be noted clinically, and they serve as controls for the first
series of observations. At least it cannot be said with regard to this
second class of patients that they were likely to have subnormal
temperatures. We might, if anything, expect to find a slight rise,
—the so-called subfebrile temperature.

From these two series of cases the following conclusions can
be drawn: the mean highest temperature found in patients who
were under observation either because of the existence of tuber-
culosis or because they had just passed through an infectious fever
was 36.94° C. (98.49° F.), the mean lowest temperature was
36.27° C. (97.28° F.), and the average temperature was 36.6° C.
(97.8° F.). All of these were taken in the axilla. (The mean
axillary temperature is .2° C. (.35° F.) lower than that of the
mouth.)

Among these hundred cases, thirty-five were suffering from pul-

monary phthisis. It has often been said that following the infectious fevers there is a period of subnormal temperature. It would seem more probable, however, that this apparently subnormal temperature is really the normal, the standard having been placed too high. This fact is apparent from a consideration of the second class of cases. In this group the highest average temperature was 36.8° C. (98.25° F.), the lowest 36.25° C. (97.25° F.), and the average temperature 36.52° C. (97.8° F.). In the second class of cases even the highest temperature was lower than in the first class, —a fact which can be explained only on the supposition that we are here dealing with temperatures more nearly normal. When a person is not entirely well a very slight disturbance often suffices to produce a rise of at least some tenths of a degree.

In a series of cases of absolutely normal individuals—colleagues in the Institute and laboratory assistants—a confirmation of the observations made on patients was obtained. Only once was a temperature above 37° C. (98.6° F.) noted. This occurred shortly after an unusually abundant meal, and was the result of slight digestive disturbance.

For four weeks I carefully took my own temperature every two hours, continuing my observations until late in the night. During this time only twice did I obtain a temperature of 37° C. (98.6° F.), and both times the rise was observed not long after eating. The morning temperature was often not higher than 36° C. (96.8° F.), the highest noted being 36.3° C. (97.40° F.). According to the usual tables of the text-books and the significance commonly accorded certain degrees of temperature, in the early morning hours, I was constantly in a state of moderate collapse. This remark will also apply to my colleagues and laboratory assistants, whose temperatures were noted. I need hardly repeat that these persons are in excellent health and show no signs of any pathological condition. Recently my observations have been confirmed by the temperatures noted in more than two hundred patients who were under prophylactic treatment for rabies at the rabies station here in Berlin. The temperatures of these patients were taken four times a day for twenty days, and it was only when there was some good reason for a rise that they exceeded 37° C. (98.6° F.).

The extreme heat of the tropics does not cause any variation in the upper limit of the normal human temperature. Even in

India, temperatures above 37° C. (98.6° F.) are rare. Professor Pfeiffer frequently noted his temperature during his residence for some months in Bombay as a member of the German Pest Commission. He tells me that it varied between 36.3° and 36.7° C. (97.3° and 98.1° F.). During his stay in Bombay the atmospheric temperature ranged between 28° and 32° C., with 90° of humidity.

Besides the observations already discussed, a series of patients in the dispensary of the Institute for Infectious Diseases were examined in order to ascertain their temperature curves. Most of them were tuberculous patients. Those suffering from uncomplicated, though advanced, tuberculosis often have temperatures not exceeding 37° C. (98.6° F.). As a rule, those above 37.3° C. (99.1° F.) cause a decided feeling of discomfort. This is a condition that I have often noted as occurring in myself, and observation would seem to justify the following conclusions:

First, the temperature of healthy individuals varies between 36° and 37° C. (96.8° and 98.6° F.).

Second, under certain circumstances rises of temperature to 37.2° C. (98.9° F.) may be noted even in healthy individuals. Some special reason, however, can always be found for their occurrence. Not infrequently, for instance, they are due to digestion fever.

Third, temperatures above 37.2° C. (98.9° F.) are always associated with a feeling of subjective discomfort, which fact proves them to be abnormal.

Fourth, temperatures slightly under 36° C. (96.8° F.) may occur without the slightest tendency to collapse.

Fifth, there are many phthisical patients in whom easily demonstrable tuberculous processes are to be found, yet whose temperatures may continue within the normal limits noted above.

The experience of most practitioners accords with my own as regards the normal temperature range,—namely, between 36° and 37° C. (96.8° and 98.6° F.). Nor is this experience of recent date. Long ago Guthmann, in his communications with regard to the selection of phthisical patients best adapted for treatment in general sanitaria, made the remark that in Hohenhoneff 37.2° C. (98.9° F.) —taken in the mouth—was looked upon as the maximum of normal temperature. This corresponds exactly with 37° C. axillary tem-

perature. It is clear, then, that it is not in the Institute for Infectious Diseases alone that tuberculous patients occur whose axillary temperature remains constantly below 37° C. (98.6° F.). Another proof that my experience in this matter is not singular is furnished by Volland. Like Guthmann, he advised that tuberculous patients should be kept in bed until all evidences of fever disappeared. The criterion for this he considered to be a temperature of not over 37° C. (98.6° F.), taken in the axilla.

School physicians in France seem to be decidedly of the opinion that the so-called normal temperature of 37.5° C. (99.5° F.) is at least suspicious. Otherwise Mirmeson would not have declared that the axillary temperature of children is generally under 37° C. (98.6° F.), and that when it exceeds that point subfebrile conditions are indicated. Careful investigation of the general health of the little patients generally showed, when the temperature rose above 37° C. (98.6° F.), that some pathological condition—usually a disturbance of the gastro-intestinal tract, constipation or diarrhœa —was present.

SCARLET FEVER: ITS PATHOLOGY, VARIETIES, AND MODES OF SPREAD.

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PATHOLOGY.

A NUMBER of infectious diseases are recognized as bacteria-bred; the more we learn of these maladies the surer is the ground on which this recognition is based. The analogy of these diseases makes it seem certain that scarlet fever has its ultimate origin in a micro-organism; the demonstration of the identity of this organism we have yet to await. So multifarious are the bacteria that can be cultivated from the throat, blood, and other tissues of patients suffering from scarlet fever that it is not surprising that one and another of these organisms has been put forward from time to time as its specific cause. Fränkel and Freudenberg's streptococcus, Eddington's bacillus, and Klein's streptococcus scarlatinæ are none of them accepted generally as fulfilling this function.

Interest in this subject has been greatly enhanced of late by the researches of Class, of Chicago, who has described an organism which he believes to be the essential cause of scarlet fever, having found it constantly in the throat and the blood of patients suffering from this disease. Grandwohl and Jacques have confirmed his observations. The organism is a coccus which may be seen arranged in various group-forms. The ultimate unit would seem to be a diplococcus, but tetrads or short chains may occur. It grows on many media and presents many differences in its different growths; but on a special medium devised by Class, earth-agar, it always presents the same appearance,—namely, that of a large gonococcus. Two entirely independent workers, Baginsky and Sommerfeld, of Berlin, published the results of a series of researches on this subject in the summer of last year. They, too, describe an organism com-

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posed of two cells, more or less flattened out against each other, which presents itself under different forms, the particular form which a growth will take depending on the medium used for the culture. The question arises whether these organisms are not one and the same. Baginsky's coccus, however, grows readily in long chains in alkaline peptone bouillon, while that of Class will not assume true streptococcal form,—an important difference. Class has carried his work to the point of inoculating white swine with his organism, an experiment which was followed by the development of a malady having certain points of resemblance to scarlet fever. Another point of interest is that this organism has been cultivated from the throats of patients suffering from follicular tonsillitis but with no scarlet-fever eruption or other sign of the disease. Into the merits of the controversy between these observers we need not enter. All that can be said is that two important contributions have been made to the literature of the subject, which will be cordially welcomed by all who are seeking light on the etiology of scarlet fever. Whether these organisms be definite entities, whether they be the same, whether either (or both if they be indeed the same) be the cause of the disease, must be left to time, observation, and experiment to decide.

With a bacterium as the ultimate starting-point, it is pretty clear that the path of invasion is through the tissues of the throat, especially the tonsil, for it is there that the initial inflammatory lesion occurs. It seems probable that to these tissues and their lymphatic apparatus the presence of the bacterium *may* be confined. This, it would seem, is what happens in those cases known respectively as *scarlatina sine eruptione* and toxic or fulminating scarlatina. In this latter division, whether the result be attributable to the great virulence of the organism itself or to the extreme susceptibility of the subject, the toxins, formed in the throat and carried into the circulating fluids, poison the tissues with such rapidity that the patient dies before the usual procedure of events has time to establish itself. The ordinary process would seem to be an *infection* in which the bacteria are carried to distant tissues, setting up dermatitis in the skin, to be followed perhaps by similar infection of the kidney, of the joints, and of other tissues. Moreover, the infection may proceed by continuity from the throat to the nose, the ear, and other neighboring structures; or it may be

that the process of scarlet fever, having been initiated by a specific bacterium, renders the tissues a ready prey to the ordinary pyogenic organisms, and that these pyogenic organisms are the proximal causes of the lesions in some of these tissues. Such would seem to be the most likely explanation of those cases of the disease which are indistinguishable in their later stages from septicæmia and pyæmia, for in them streptococci and staphylococci are found in abundance. There may, too, be a similar explanation in those cases with rheumatic manifestations,—synovitis, pericarditis, and endocarditis,—namely, that the micro-organism of rheumatic fever (if there be one) finds the paths of resistance lessened during the attack of scarlet fever, or it may be lying dormant in the tissues ready to be awakened into activity by the attack. Such phenomena are generally seen in patients who have suffered from rheumatism before, and, apart from the scarlatinal attack, they are hardly distinguishable from those of mild acute rheumatism.

Briefly stated though they have been, these considerations seem to point out the lines along which it may eventually be demonstrated that the process which we know as scarlet fever works.

Whatever its ultimate pathology may prove to be, scarlet fever is a well-defined clinical entity. Though in the absence of an actual bacteriological criterion a proportion of cases presenting certain features or groups of features common in scarlet fever will be incapable of absolute diagnosis, the fact remains that the disease is usually a characteristic one. Allowance must always be made for the variations from the type, but, once recognized, these variations are in themselves as characteristic as the type itself.

Scarlet fever is a disease of childhood and early adult life. It is not common under one year of age; after that year the liability increases up to the fifth year, remains fairly steady till the tenth, whence it declines consistently with each year of life, the fall being especially marked after fifteen. Females are slightly more frequently attacked than males. Excepting the first year, the severity of attack and case-mortality decrease with each year of age; the death-incidence on adults is very low. It is, then, among children in the first quinquennium of life that the most severe and most frequently fatal cases are seen.

The incubative stage is short,—generally from two to four days,—but it may be prolonged to seven or even to nine days. The

illness begins with the usual concomitants of febrile disturbance; headache, vomiting, and dysphagia are the most frequent initial symptoms. The average time for the appearance of the eruption is twenty-four hours after the onset: it may be less and is seldom delayed beyond two days.

To take the general features of the disease first, we find that common to all varieties of scarlet fever, with the exceptions to be mentioned later, is dermatitis. Like the dermatitis caused by all specific poisons, it has its distinctive characters. The cheeks, neck, and upper parts of the chest are first affected; then the proximal portions of the upper limbs, the chest, the abdomen, and the proximal portions of the lower limbs, in the order named; later the distal portions of the upper and finally those of the lower limbs. The dermatitis may be mild or severe, and in proportion to its severity will be the degree of the inflammatory swelling and hyperæmia. In a moderate case the hyperæmia is seen around the hair-follicles, which are the centres of those tiny red dots that form the characteristic punctiform rash. Between the hyperæmic puncta are pale patches of skin, but in a severe inflammation these are obliterated by the coalescence of the edges of the puncta; thus a continuous, uniform, erythematous blush is produced. Such blushes will, of course, fade on pressure by the fingers. If the dermatitis be more intense, there may be actual extravasations of blood, generally limited to the points of most severe inflammation,—the puncta around hair-follicles. Such points will not fade on pressure. Besides the reddening there is, in the case of a sharp inflammation, actual œdema of the skin, a feature especially well seen where the punctation is little marked,—namely, on the hands and feet.

The rash, then, is a bright scarlet, punctiform erythema; it is well seen at points of pressure, the back, axillary folds, and groins; ill seen on the tumid hands and feet; not seen in the face, but represented there by the flushed cheeks, thrown into striking relief by the waxy pallor of the circumoral zone. In a few days the rash fades, but often leaves behind it a lingering inflammation of the hair-follicles, especially those of the outer sides of the legs and upper arms; these coarse, upstanding, crimson points are of some value in making a presumptive diagnosis.

It has been said that the rash may be continuous, forming one deep, uniform flush; in mild cases it may be patchy in its distribu-

tion; often the distal portions of the lower limbs escape altogether. There are in the rash two further variations that are important. The first is the occurrence, especially in warm weather, of miliary vesicles over the red points, sometimes a good deal larger than the ordinary miliary vesicle. If these persist for some days, the contents of the vesicles become turbid. This fluid is like thin pus when evacuated, though invariably sterile, as far as my observations have gone. The other variety is that known as scarlatina variegata, not common, but important in that it is apt to be mistaken for measles. In this condition there are irregular groupings of the rash into papules, much like those of measles, standing out on pale areas of skin. It is on the limbs that this phenomenon is observable, but we will seldom fail to find, concomitantly with it, patches of punctiform or continuous erythema of the trunk that enable us to make the diagnosis with tolerable certainty.

The natural sequel to the dermatitis is the exfoliation of the epithelial scales raised by the inflammatory hyperæmia and exudation. This process, beginning with powdery desquamation of the face, follows the order of appearance of the rash. The neck, a few days after the rash has gone, shows peeling, often characteristic in that the ring around the hair-follicle is exfoliated, and this is followed by peeling on the trunk and limbs. In proportion to the dermatitis so will the desquamation be: a severe, continuous erythema will be followed rapidly by extensive shedding of large strips of epithelium; a mild rash will show but a few branny or powdery scales. In any genuine case of scarlet fever it is seldom that the hands and feet fail to show scaling of so extensive and persistent a character as to clinch the diagnosis.

The shedding of the epithelial scales leads to a suppression of the secretions or to a blocking of the ducts of the sebaceous glands; the exposure of the deeper layers of the skin, whilst in this parched condition, to climatic and other influences is very apt to produce superficial cracking. This xerodermia occurs most commonly in dry, frosty weather, and, if not attended to, leads to superficial, weeping excoriations, which sometimes become very obstinate, especially in the flexures of the skin. This condition has gained a meretricious importance in England since the medical superintendent of a large provincial isolation hospital was successfully sued for having discharged a patient with such a lesion of the skin; it was

considered to be evidence of the continuance of the disease and therefore of the infectiousness of the patient.

Not only is there dermatitis, but the buccal and pharyngeal mucous membranes are inflamed. These are injected and the tissues of the throat are generally also œdematous. The tonsils, which are the seat of primary invasion, show in most cases more or less exudation, white or yellowish white in color. This varies in extent from discrete specks to a membranous exudation that clothes the whole tonsil and spreads on to adjacent structures. The intensity of the pharyngeal and tonsillar inflammation is a marked feature in scarlet fever, contrasting strongly with diphtheria in this respect, for the tissues take a long time to regain their normal appearance; in severe cases ulceration and even extensive destruction frequently occur, whilst adenitis of the submaxillary lymphatic glands is nearly always very persistent. The tongue is generally thickly coated with sodden epithelium, through which peep the tips of the fungiform papillæ. Denudation of the epithelium occurs in three or four days, leaving the tongue bare and pinkish red, with staring, upstanding, fungiform papillæ. Both these conditions are described as the "strawberry tongue" by different writers; to the latter the term is more aptly applied. This phenomenon is generally assumed to be characteristic of scarlet fever, but, though common in that disease, it is far from being confined to it: it is met with in measles and enteric fever, to name only two possible sources of confusion.

VARIETIES.

The separation of various cases of a disease into arbitrary categories is never a very satisfactory procedure, as there are always a number of border-land cases which will not fit accurately into any pigeon-hole. Still, a practical and as far as possible a natural grouping of cases is helpful. The classification which I suggest as being the most generally useful and comprehensive is the following.

1. *Mild (or Ordinary) Scarlet Fever.*—This variety constitutes the bulk of the cases that are encountered. The patient is not very ill: the throat may show nothing beyond a little reddening or a few specks of exudation on the tonsils; the submaxillary lymphatic glands are natural or slightly enlarged and hardened; pyrexia is but slight, lasts only three or four days, and sometimes is entirely absent. Desquamation follows in due course.

2. *Infective Scarlet Fever.*—In ordinary scarlet fever the microbic lesion is confined to the throat and its lymphatic apparatus, with some easily resisted infection of other structures. In infective scarlet fever the lesions are not so limited, but the bacterial infection spreads either to adjacent structures or to more remote ones, or to both. Whatever the micro-organism may be, it is either pyogenic in itself or is rapidly followed and assisted or displaced by pyogenic organisms. Thus we have two conditions under this head: (*a*) *Locally infective scarlet fever,* in which the infection spreads from the pharynx to the nasopharynx, nasal tissues, larynx, Eustachian tube, middle ear, temporal bone, lateral sinus, and even to the dura mater and brain, by direct continuity or by the lymphatic channels to the submaxillary and cervical lymphatic glands and adjacent cellular tissues. Whenever this infection is severe, there is always marked constitutional disturbance. (*b*) *Remotely infective scarlet fever* (which is practically always a sequel to the former), in which distant tissues, such as the kidney and joints, are affected.

3. *Toxic Scarlet Fever.*—(*a*) *Immediate.*—These are the fulminating or foudroyant cases, in which the patient is stricken down by an acute general toxæmia and dies from hyperpyrexia, rapid cardiac failure, perhaps with convulsions, in twenty-four or thirty-six hours after the onset of the disease, sometimes before the rash has had time to develop. Happily, these occurrences are very rare. The diagnosis of an isolated case is often open to doubt, but may be assisted by cases of ordinary scarlet fever occurring subsequently in the same house.

(*b*) *Deferred.*—There occur very rarely cases of apparently mild scarlet fever in which, without warning, symptoms of acute cardiac failure come on four or five days after the onset. Such patients may appear convalescent and yet be dead in less than twenty-four hours.

4. *Hemorrhagic Scarlet Fever.*—This form is characterized by epistaxis, hæmaturia, and hemorrhages into the skin. It is very uncommon and almost always ends fatally in a few days. Personally I have never seen nor heard of a reputed case of this kind that was not capable of explanation on other hypotheses. A great many cases of hemorrhagic diphtheria have undoubtedly been confused with this condition.

5. *Scarlatina sine Eruptione.*—It is a moot clinical question

whether there be such a disease. Pathologically there is no *prima facie* reason why the infection should not be localized in and confined to the throat and its adjacent lymphatic system. If Class's conclusions be accepted, this would seem to be the case. The fact remains that in epidemics of scarlet fever brothers and sisters of the patients often suffer from a follicular tonsillitis, sometimes accompanied by the strawberry tongue, without exhibiting any rash.

MODES OF SPREAD.

Scarlet fever is undoubtedly a disease that is personally infectious; its incidence on hospital attendants is sufficient to prove this. There is also evidence to show that it is infectious through intermediary vehicles. Beyond that it is impossible to make any definite scientific statements as to its modes of conveyance. Water, drains, and soil, three of the baffled sanitarian's stand-bys, have never been effectively shown to have any connection with the disease. Milk seems to act as a vehicle; in fact, several epidemics have been traced to this presumptive cause. Most of these have been attributable to human agencies. The question as to whether the cow suffers from scarlet fever, and if so, whether it may transmit infection to its milk, must still be considered *sub judice*. Bovine scarlet fever is not admitted by veterinarians, though Klein still holds to his original views on the subject. The practical fact remains that milk is generally regarded, on some very fair evidence, to be a means of conveying the infection: it should, therefore, be boiled if suspicion rest on it.

Evidence also tends to show that articles of clothing, bedding, and such like are capable of proving infectious for long periods after they have been in contact with cases of scarlet fever. Probably this is the case only when they have been actually stained with discharges from the throat, mouth, nose, or ear.

Seasonal influences undoubtedly facilitate the propagation of the disease, though in what these influences consist it is hard to say, in view of the fact that whilst in New York the mortality curve for scarlet fever is highest in April and lowest in September, ours in London is almost precisely the reverse.

Whatever may be the factors that determine the epidemicity of scarlet fever, there is no doubt that the main cause of infection is the existence of cases of the disease itself; that is to say, that per-

sonal infection, either directly or through some medium, is at the bottom of most of the cases that occur. The two chief characteristics of the infection are its comparatively short range and its extreme persistency. In order to appreciate the *raison d'être* of these peculiarities it is well to seek for the probable situation of the infecting material in the infectious subject. What has been said of the pathology of the disease leaves us in very little doubt as to this situation. A process that starts in the throat-tissues, that clings to them with such tenacity, that spreads directly from them to neighboring structures, that would seem on all bacteriological grounds to find its fountain-head in these structures, surely such a process must be the work of the specific micro-organism in those tissues, aided perhaps by others. This being the case, one looks not unnaturally to the pharynx, especially to the nasopharynx, as the *fons et origo* of the infecting matter, and to those extensions of the morbid condition, rhinitis and otitis media, as being the preservers and propagators of the germ. Stowed away in the recesses of the nasopharynx, the choanæ of the nose, or the Eustachian tube and its contiguous structures, the germ may lie dormant for weeks or months, giving expression to its activities by the incitement of some morbid process, such as pharyngitis, rhinitis, or otitis (those commonest of scarlatinal sequelæ), whenever local or general depressing influences are propitious.

Not only does intelligent pathology teach us to look here for the infecting germ, but facts as they accumulate tend to show this to be the source of infection. All isolation hospitals having many cases of scarlet fever find that their " return" cases—*i.e.,* those which seem to have been infected by recently discharged patients—are considerably more numerous for this disease than for any other. These cases are the subject of a good deal of controversy and much theorizing. The upshot of it is this, that there is no criterion at present known of the infectivity or non-infectivity of a given patient. It is rather a blow to such cherished traditions of our science as the infectivity of desquamation has been and still is to find again and again that a patient who has been carefully detained for a fortnight or three weeks beyond the regulation time, because of a few adherent scales on his heels, may go home and infect his family. The routine period of isolation of patients has in many hospitals been lengthened to eight or ten weeks, even though the patients be

apparently healthy in every way long before that time has elapsed; yet these cases return home and spread the infection. Fortunately, there is a clue which, diligently followed up, will often help us to localize the peccant agency. Of two hundred and fifty-three cases of scarlet fever which occurred within six months in the houses of those whose children had recently returned from the Metropolitan Asylums Board Hospitals after isolation for scarlet fever, ninety appeared to be due to direct infection from the returned patients; in one hundred and sixty-three cases the infection was otherwise accounted for. The ninety patients who proved to be still infectious had all been detained in hospital for considerable periods, one as long as eight months. Of these ninety only three had any sign of desquamation, whilst, on the other hand, only three appeared to be perfectly healthy: all the rest suffered from unhealthy conditions of the throat, ear, or respiratory passages, no less than fifty-four having rhinitis alone or in combination with other morbid conditions. In other words, out of the ninety cases that were obviously infectious ninety-three per cent. had clinical signs of pathological processes in those very structures that we believe to be sites of activity of the scarlatinal germ.

The strong presumption is that the germ of scarlet fever often persists in the pharynx, nasopharynx, nose, and ear-passages long after all outward signs of its activity have ceased; that some chill or other predisposing cause may enable it to set up an otitis, rhinitis, or pharyngitis; that under these conditions discharges from the ear, nose, and throat contain the germ (which seems to have great power of resisting desiccation); that it is by the translation of the germ so extruded to others that the infection is conveyed; and that the germ may be conveyed either directly by the discharges or through the medium of some article contaminated thereby.

Is desquamated epithelium not infectious, then? It is hard to see how it can be so *per se,* but there is no reason why floating particles of skin *that have been contaminated by discharge from the nose or ear* should not act as vehicles of infection, just as a coat or a handkerchief may do. Milk, which is an excellent culture-medium for many bacteria, may allow the micro-organisms of this disease to multiply in it when contaminated by the secretions of an infected patient.

From the practical point of view one is not helped much by

these reflections. Take away the old rule of thumb about desquamation and what have we in its place? The probability that unhealthy conditions of the pharynx and its communicating passages are infectious; also that any given scarlet fever convalescent may, speaking clinically, become infectious at any moment long after he is apparently well. On the other hand, a large number of cases of scarlet fever are probably not infectious at all after a week or two. I never could find a tittle of evidence to support the assertion that scarlet fever is not infectious at its onset; the only purpose it seems to serve is to point the moral that measles is infectious before the rash appears and that scarlet fever is infectious long after it would seem likely to be so. All we can say, then, is, that, given a healthy condition of the throat, nose, and ear, one can never say whether the patient may not become infectious.

The indications that result from this state of things are: 1. Never to discharge a patient unless the nose, ear, and throat are absolutely natural to clinical inspection. 2. To isolate a young child, who is far more likely to have nose and ear complications, longer than an adult who has a mild attack and is not likely to have such complications. 3. To hesitate to discharge a child who has had rhinitis or otitis until all signs of these have been absent at least two weeks. 4. Not to fear to discharge a patient, who is otherwise perfectly satisfactory, because he has some tough adherent scales on his palms or soles. 5. To advise the parents to guard a discharged child from any source of detriment to his health, to keep him from sleeping in the same bed with other children, and to isolate him promptly if sore throat or a discharge from the nose or ear occur.

Should any means of personal disinfection be carried out? The answer to this would seem to be that, if anything effectual can be done, it should by all means be insisted upon. This raises the question as to what is effective, and here we find ourselves on very unsatisfactory ground. The traditional lavage of a patient before rejoining the family circle may have much to recommend it on the score of personal cleanliness, but as to exerting any germicidal influence on micro-organisms of the skin (which, we have seen, do not seem to be the infectious ones in scarlet fever), we know the bacteriological futility of such a procedure. If to this be added the fact that the cleansing generally consists of a hot bath and is

followed immediately by taking the patient out into the streets, often in inclement weather, one can imagine no more suitable conditions to establish a chill which will set up a nasal or pharyngeal catarrh,—in other words, to induce precisely the state most dreaded. Antiseptic washings of the nose, throat, and ear may possibly be of value, but there are few patients who would submit to treatment on these lines for such a length of time as alone could make it efficacious.

It is an humiliating confession, but we are bound to admit that we do not know with any degree of accuracy the *materies morbi* in scarlet fever nor how to accomplish its destruction.

GONORRHŒAL RHEUMATISM.

BY CAMPBELL WILLIAMS, F.R.C.S. (Eng.).

GONORRHŒAL RHEUMATISM is the time-honored designation which, although descriptively and pathologically incorrect, serves to express concisely a condition occurring either in the course of an infective urethritis or in conjunction with some lesion of the genito-urinary tract. The vast majority of cases arise in patients suffering from incontestable penile sepsis. A certain number seem to be secondary to vagino-uteral lesions, to instrumental abrasions, or to a discharge of a gouty nature when a history of recent gonorrhœal infection is lacking. The comprehensive term " urethral arthritis," which is used on the Continent, is perhaps the best name for the disease. It gives a broad recognition to the possibility of origin from a plurality of septic microbes rather than particularizing the specific organism.

In gonorrhœa the primary and dominant pyogenic excitant is the *Diplococcus gonorrhœæ*. But its presence at the site of deposition is so quickly associated with other organisms of suppuration that its pure cultivation, to the exclusion of kindred microbes, becomes impossible. Modern research has shown that the occurrence in gonorrhœa of the so-called " rheumatic symptoms" is due to the lymphatic absorption and subsequent vascular distribution either of a toxin or of the originating micro-organisms which infest the urethra in the male and additionally the special genital organs of the female. Various observers are said to have demonstrated the presence of the *Gonococcus,* the *Staphylococcus,* and the *Streptococcus pyogenes aureus,* or its modification the *Streptococcus articulorum,* in the affected joints and adjacent tissues.

It has been assumed that the local and general constitutional disturbance is consequent upon the action of a " toxin" eliminated by these organisms. Although the clinical features of most cases of gonorrhœal rheumatism differ essentially from typical pyæmic

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or septicæmic infections, nevertheless a small percentage of those attacked present such a close resemblance to these diseases as to be practically indistinguishable from them. In the more virulent form of the affection the pyæmic picture of articular disorganization, sequent to suppuration, cartilaginous erosion, osseous necrosis, with pyogenic infarction of the viscera, is occasionally met with. The entrance of the virus into the general system and its eventual conveyance to parts of the body primarily remote from the site of infection would seem to be dependent upon (a) absorption under pressure, (b) inoculation through a breach of surface, or (c) aggressive penetration of the mucous membrane by micro-organisms.

Inoculation may result from an abrasion of the fossa navicularis caused by the introduction of a sharp-pointed syringe or from a minute laceration of the urethral mucous membrane due to the passage of instruments. In two severe cases of urethral arthritis the onset followed shortly after " acupuncture" for preputial œdema. Absorption under pressure finds a ready explanation in the invasion of the urethral ducts leading to the formation of minute lacunæ or the larger periurethral abscesses. From the foci of infection the generic organisms or the products of sepsis spread, or are carried by tensive force, along the lymphatic channels until they reach their ultimate vascular destination. Invasion from simple contact of the mucous membrane with a gonorrhœal or septic discharge, when there is no breach of surface, would imply an inherent penetrative power of an aggressive living organism rather than a toxic fluid filtration.

The symptoms of gonorrhœal rheumatism resemble, and are apt to be confounded with, those of acute rheumatism. The etiology of the latter disease is not, so far as I know, based upon bacteriological evidence. The theory, that it is caused by a micro-organism, though plausible, is not yet proved. While the two diseases resemble each other in their predilection for attacking joints and fibrous structures, there yet remain clinical and micro-organic features in the gonorrhœal affection which serve not only to distinguish it but also to relegate it to the pyæmic or septicæmic domain.

Gonorrhœal rheumatism occurs more frequently in males than in females. One reason adduced for this phenomenon is that gonorrhœa in woman is often a limited vulvo-vaginal affection, the urethra escaping contagion. Another is that the shorter and more

patent feminine urinary canal influences its non-production. The more probable explanation is that the exciting cause is more prevalent in the male sex, and that, owing to its operations being confined to a less accessible area, and therefore less amenable to treatment, the malady is of longer duration and greater severity than in the female. A rheumatic or gouty diathesis is said by some, denied by others, to predispose an individual suffering from gonorrhœa to an attack of the "rheumatic complication." In a great number of cases a previous rheumatic history is absent. As is well known, certain diseases, as syphilis and tubercle, show a preference for sites where the vitality of the tissues has been previously lowered. When two diseases, such as rheumatism and its gonorrhœal namesake, have an affinity for similar structures and localities, it is readily conceivable that an antecedent attack of the one would render the patient's tissues more susceptible to invasion by the other.

Cold, traumatism, rheumatism, or a prior gonorrhœal involvement are all cited as predisposing or determining causes for the manifestation of this complication. Each and all tend to lower the vitality of a part and thus perchance render it more vulnerable, so that it becomes the selective prey of nomadic organisms, which find in it a more congenial sphere of action than in a more robust prototype. A person who has once suffered from gonorrhœal rheumatism is prone to a fresh outbreak whenever he contracts a venereal discharge. It usually returns in or to the neighborhood of its former exploits. Thus, one patient had his right ankle-joint affected in his first attack of gonorrhœa. In his second attack the same articulation was again involved and in addition he developed lesions in the left knee and the left shoulder-joint. For months or even years after recovery the affected joints may be sensitive, with almost barometrical accuracy, to thermal or climatic variations, so that they serve, even if the sufferer has escaped articular impairment or deformity, to remind him of his former trouble.

Fibrous tissue being the selective site for the activity of the disease, its ravages are experienced wherever fibrous elements enter largely into the construction of a part. Thus, the joints, tendons, bursæ, nerve-sheaths, fasciæ, eye, pericardium, and endocardium are all structures in which its effects have been chronicled. In contradistinction to acute rheumatism, the gonorrhœal com-

plication is inclined to be a monoarticular and stationary complaint. One joint alone may be implicated, but occasionally more than one may be involved. It is also more persistent, with but little tendency to clear up in one joint whilst invading another. In the arthralgic type, however, transference to a neighboring fascia or to a remote nerve is not uncommon. Any joint of the body, even the vertebral or laryngeal, may be invaded. It is most usually associated with the knee, ankle, wrist, elbow, shoulder, or hip; in other words, it shows preference for articulations of the first and second grade. The sacro-iliac, temporomaxillary, costochondral, and sternoclavicular are among the articulations less liable to the affection.

The clinical symptoms in a case of urethral arthritis differ acording to the severity of an attack and with the *portion* of the articulation involved. This has led to the classification of a case in accordance with the predominant symptom. Thus, one speaks of an hydrarthritic, an arthritic, an arthralgic, or a pseudo-arthritis deformans condition.

In hydrarthrosis the striking feature is fluid distention of a joint; with arthritis the integuments and the fibrous appanage of the articulation are essentially involved; in arthralgia the objective symptoms are slight or wanting while the subjective one of " pain " is pronounced. Pseudo-arthritis deformans is, as the name implies, that type in which periarticular osteal deposits are the characteristic resultant.

The onset of gonorrhœal rheumatism may be insidious or sudden. It may develop within from six to twenty days subsequent to contagion, or its appearance may be postponed until several weeks have elapsed.

Hydrarthrosis, or synovial effusion, usually affects a single joint, and by preference the knee. Occasionally several articulations may be attacked. Thus, both knees may be involved or a knee, an ankle, and a shoulder may be synchronously implicated. Frequently, but not always, insidious in its onset, it gradually increases until the acme is attained. The advent may be heralded by slight stiffness or uneasiness of the joint. Effusion rapidly ensues, the articulation becoming distended, hot, and painful. The skin has a heightened tint, with a smooth, stretched, glossy appearance. The limb assumes a semiflexed position, which is not only

one of rest but also that which gives the greatest containing capacity to the joint. The disease ordinarily ends in resolution, but its course may be marked by relapses, so that it may persist from five weeks to five or more months. Intra-articular suppuration rarely occurs. If it, unfortunately, happens, disorganization of the joint ensues, and, notwithstanding the employment of early and free incision and drainage, the patient may succumb to pyæmia. In the case of a medical student who suffered from this additional complication, no less than five joints suppurated and had to be surgically treated. He recovered, more or less maimed, from this attack, only to fall a victim two years later to pyæmia secondary to a post-mortem infection of the hand.

The arthritic variety of gonorrhœal rheumatism may be regarded as a cellulitis. The soft parts surrounding the joint have a phlegmonous appearance. There are œdema, redness, heat, and pain, in fact all the signs of threatening or actual suppuration, a condition, however, which rarely ensues. The synovial sheaths of the subjacent tendons are more or less effected and distended by effusion. The implication of the synovial cavity of the joint itself is a variable quantity. Sometimes the amount of fluid is very slight; in other cases there may be marked fulness. Pain or aching is severe, so that the least movement, voluntary or passive, of the affected articulation may be agonizing. Manipulation of the part conveys a crackling or grating sensation to the examining fingers. The ankle, elbow, and wrist-joints seem more prone than the knee to the arthritic variation. Ankylosis more frequently follows an attack of this nature than in hydrarthrosis. The impaired mobility is due to ligamentous, fascial, or tendinous contractions and adhesions. It is not uncommon for three or four months to elapse before the sufferer can attempt to use his temporarily or permanently impaired limb. The onset is, as a rule, more sudden than in the preceding type of the malady, and constitutional disturbance is usually considerable. The temperature rapidly rises to 102° F. or higher, with prodromal or intercurrent rigors. The tongue, at first covered with thick white fur, quickly assumes a brown septic tint and becomes dry. There is a notable absence of " red lines" extending any distance from the immediate vicinity of the inflammation, such as are seen in ordinary cellulitis. In cases where multiple incisions have been employed, either with

a view to relieving tension or on the assumption that suppuration has occurred, it is usually found that the tissue infiltration is not purulent but serous, perchance containing a few flakes of lymph.

Arthralgia may arise during the acute stage of gonorrhœa, but it more usually complicates a chronic arthritis. It seems to be of the nature of a toxic periostitis, analogous to, but more persistent and intense than, the prodromal bone and joint aches that are met with in the acute specific fevers. Objective signs in this variety are ordinarily absent. The predominant symptom is pain. This is of a gnawing or aching character, and is frequently worse at night than by day. It is most pronounced at the points of ligamentous insertions. One or more of the larger joints may be attacked in succession. This form of the malady exhibits a greater tendency to change or extend the site of operations than is noted in the other varieties. Thus, it may shift to an adjacent fibrous structure, or it may involve the sheath of a large nerve, such as the sciatic or the musculospiral. Progress towards final recovery is tedious and liable to exacerbations and relapses. One reason for their occurrence probably is that the mobility of the joint is not mechanically impaired, so that the patient is tempted to use it whenever there is a temporary remission or disappearance of the pain, and thereby induces increased vasomotor activity. Another explanation is found in the persistence of the chronic urethral discharge, which supplies the necessary excitant for a fresh outbreak.

Pseudo-arthritis deformans is an excessively rare phase of the malady. The fingers and toes, together with their accompanying extensor tendons, are usually implicated. In one case under observation there were also osteophytic deposits at the upper ends of both tibiæ. The deformity in these cases permanently cripples the patient. It is due mainly to nodulation of the ends of the bones entering into the formation of the joint, and also to ligamentous contractions or tendinous adhesions subsequent to tenosynovitis. The osteal impediments chiefly affect the dorsal aspect of the joint. The digits are in a position of partial extension. The prominent ends of the metacarpal or metatarsophalangeal bones give an appearance of subluxation to the articulations. The onset is characterized by marked swelling of the affected fingers or toes. There is effusion into the sheath of the governing extensor tendon. The pain is extremely severe at first, and is probably proportionate to

the amount of tension exerted. It subsides as the swelling goes down or as the joint becomes fixed.

Fasciæ.—The palmar and plantar fasciæ may be affected either independently or in conjunction with some other lesion. The inflammation may arise in them primarily and remain restricted to these structures. More often it is secondary to adjacent articular mischief and is the result of extension or transference. Should much contraction ensue, a condition of pseudo-claw-hand, or pes cavus, may ensue. Flat-foot is sometimes a sequela of gonorrhœal rheumatism. Any of the enveloping aponeuroses of the limbs may be attacked, such as that of the calf of the leg or the thigh. The iliotibial band is occasionally singled out.

Tendons.—The tendons surrounding an infected joint usually suffer in conjunction with it, but a tenosynovitis is said to occur apart from any other manifestation. The tendon-sheaths most liable to suffer are those of the extensors of the hands and feet and the hamstring muscles. The expansion of the semimembranous tendon, which forms a great part of the posterior ligament of the knee-joint, is, if involved, apt to lead to intractable flexion of that articulation.

Implication of *bursæ* is met with. Those most subjected to pressure or friction suffer most frequently. Accordingly the superficial bursæ over the olecranon, the patella, or the ischial tuberosities are often involved. The bursal sac between the os calcis and the tendo-Achilles, the subacromial one, between the head of the humerus and the superimposed structures, and that over the great trochanter of the femur are also sites of election. Pain over the ischial tuberosities occurs with prostatitis. In this condition it is " referred." It differs from that of bursitis. It is a dull ache, difficult to locate exactly, intensified or lessened if the patient's attention is respectively drawn to or from it. It is apt to disappear temporarily or to change its site, whilst similar uneasiness is usually complained of in the inguinal, lumbar, or suprapubic regions. It is relieved by gentle pressure, whereas this cannot be borne when the bursa is affected.

Gonorrhœal rheumatism may attack and restrict its energy to a *nerve*. In other cases the neuritis forms only a part of a more general manifestation. The condition is exceedingly painful, persistent, and intractable to treatment. The great sciatic and its popliteal divisions or the musculospiral in the arm are the nerves

most commonly affected. In one case the fifth right intercostal nerve was singled out. The neuralgia started one week after the penile infection. The acute stage lasted for three weeks, when it settled down to a chronic condition which persisted for several months. In three instances where the great sciatic was involved, to the exclusion of any other part of the body, there was continuous pyrexia: notwithstanding the employment of large doses of salicylate of sodium, the temperature ranged from 100° to 102° F., being lowered only temporarily by the perspiration following administration of the drug. In one case the pain was felt chiefly over the gluteal branch of the small sciatic which ramified over the great trochanter. Although the neuralgia may persist more or less for months or years, amelioration usually takes place with a diminution or cessation of the urethral discharge.

The Eye.—It has been said that gonorrhœal rheumatism may attack the conjunctiva, sclerotic, or iris *individually* and *exclusively.* The malady certainly shows a marked partiality for and tendency to limitation to definite regions and structures, but, excluding a restricted iritis, there is reason to doubt the accuracy of this statement, and, if sclerotitis or conjunctivitis be present, an additional source of mischief should be sought for.

The conjunctiva, as in any other febrile state, is liable to hyperæmia. This suffusion is probably due to a circulatory irritant, toxic in nature, acting upon it from *within.* There is no definite primary and localized conjunctivitis, as in traumatism or in catarrhal ophthalmia, which arises and remains strictly confined to that coat. Such as occurs is in conjunction with more deeply seated mischief,—for instance, an iritis or an iridocyclitis,—and is proportionate to and governed in its intensity by the acuteness of the graver affection. Limitation to the sclerotic is likewise theoretically possible. Practically it does not happen: there is always some other structural involvement. Ophthalmological examination will invariably disclose a concomitant chorioiditis or an iridocyclitis. Episcleritis with cyclitis is the condition usually met with.

Iritis, with involvement of the ciliary processes, is the commonest ophthalmic manifestation of gonorrhœal rheumatism. As a rule, it occurs in conjunction, but secondary in point of time, with some articular lesion. But it may arise as an independent

symptom of the malady. It closely simulates its rheumatic proto-type, so that, if the presence of a urethral discharge be overlooked or wilfully concealed by the patient, an etiologically incorrect diag-nosis will probably be made. The inflammation is nearly always severe and is prone to affect both irides, one eye suffering more than its fellow. It rarely starts in both globes simultaneously. Sometimes the pain is excessively severe. In other cases there may be very marked inflammation and comparatively slight pain. Relapses are common and may be expected should an articular exacerbation occur. In spite of all treatment, the disease often persists for weeks, months, or even years. The deposition of ureal pigment on the anterior surface of the lens may cause obscuration of vision. Posterior synechiæ, very rarely anterior, may not only interfere with sight, but also tend to perpetuate inflammation and to be followed by their usual sequelæ. Panophthalmitis, leading to disorganization and necessitating excision of the globe, is, for-tunately, a very rare phenomenon. The condition is similar to that met with in puerperal septicæmia. My friend Mr. John Tweedy, who has seen several of these cases and who has written on the subject, is inclined to look upon them primarily as "sup-purative chorioiditis." Although the presence of the gonococcus has not been demonstrated within the excised eyeballs, one would be inclined to suspect it or some other pyogenic micro-organism, rather than an irritating toxin, as being the *fons et origo mali.*

The Heart.—Pericarditis or endocarditis rarely, and according to some authors *never,* occurs as a gonorrhœal complication. In those cases recorded as such the cardiac symptoms were slight, ill-marked, and liable to have been overlooked.

Diagnosis.—The recognition of gonorrhœal rheumatism is gen-erally assisted by the patient's complaint or acknowledgment of a urethral discharge. In certain cases, perchance from shame or in view of possible legal eventualities, not only is genital contamination strenuously denied, but its presence is concealed by subterfuge. A differential diagnosis between this malady and acute rheumatism may become necessary. The cardinal points to be noted are a mon-articular rather than a polyarticular proclivity, the grade of joint implicated, the nature of the inflammation, its stationary or migra-tory tendency, the occurrence of exacerbations in an already in-fected rather than a fresh site, and the persistency of the malady

and its resistance to treatment. In addition there is an *absence* of the acrid sour-smelling perspiration, whilst the characteristic rheumatic tongue and urate-laden urine are wanting. These signs, positive and negative, coupled with the lesser constitutional disturbance, a more gradual development, and the non-appearance of cardiac complications, form a collective chain of symptoms which should serve to unravel the problem. In the more serious aspects of the disease a differentiation from true septicæmia or pyæmia, other than nominal, cannot be upheld by either clinical or postmortem evidence. Hydrarthrosis might be mistaken for chronic tuberculous synovitis—hydrops articuli—or for syphilitic effusion of a joint. The arthritic form might be confounded with ordinary cellulitis. In the latter complaint rigors are the rule rather than the exception. There is greater constitutional disturbance. The inflammation spreads rapidly along the areolar planes, whilst suppuration and necrosis of the tissues are apt to occur, rather than resolution by subsidence as in the gonorrhœal affection. With regard to the diagnosis of isolated and localized phenomena there is nothing to guide one's judgment as to the nature of the aches and pains, in the absence of a knowledge of urethral discharge or some other prompting symptom; but the persistency, if not the intensity , of the lesions would sooner or later lead one to suspect their true character.

Treatment.—In ordinary surgical septicæmic intoxication the golden rule is to endeavor to cut off the supply of the toxin by evacuation and drainage or by germicidal disinfection of its manufacturing organisms and to combat its effects by drugs or antitoxic serotherapy. In cases of pyæmia, and its near ally septic infection, however, it is evident that the surgical treatment of the primary and exciting lesion concerns it alone. It has no direct curative action on independent and disseminated foci of pyogenesis. Each separate infarct has septic power and individual action, and consequently requires, if possible, personal attention.

In those cases of gonorrhœal rheumatism which partake of the nature of a septic intoxication, amelioration can be expected when one attacks the *cause* rather than the symptoms that it evokes. An entire remission of the articular or other signs cannot be expected to ensue directly upon a cessation or diminution of the discharge. There is often, nevertheless, a marked and rapid improvement.

The urethritis, if such be the exciting factor, should accordingly receive immediate attention.

Some observers have noted that a similar arthritic alleviation sets in with a return of a suppressed penile discharge or with an increase of a scanty flow. This improvement, which is often seen, can be explained paradoxically. The amelioration is not due to the return of the suppressed discharge, but rather the increased purulent flow is consequent upon a diminution of constitutional or toxic disturbance. It is more the sign than the cause. In all pyrexic states there is a tendency for the secretions of the body, physiological and (with certain exceptions) pathological, to become scanty or diminished. Take, for example, a superficial discharging wound. With a high rise of temperature it becomes dry; when the fever falls the secretion returns. This is in part due to evaporation, from increased heat, of the watery constituents of the pus. But there is strong reason for thinking that the process is a more complex one, and that there is possibly a toxic inhibitory action at work upon the vasomotor mechanism.

The best treatment of the urethritis will be found in the combination of germicidal injections and specific medicines. The local efforts must be governed by the amount of inflammation present and by the patient's toleration of injections. If frequent syringing can be borne, it should be repeated every four or five hours.

The most efficacious solutions for this purpose are those of permanganate of zinc (from one-twelfth to one-eighth of a grain to the ounce of distilled water), protargol (from half a grain to one grain to the ounce), and perchloride of mercury (from 1 to 10,000 to 1 to 6000). In cases where the urethral inflammation renders these unbearable, resort may be had to warm boracic lotion (1 to 20). These are the proportions in which the remedies are employed by the writer; when of greater strength they are apt to produce irritation if frequently used. A boric acid lotion of 1 to 10 is used with an equal amount of warm water. Many urethræ are intolerant of even the weakest solutions of perchloride of mercury. Another most useful formula is the following:

> ℞ Zinci chloridi, gr. ½;
>   Bismuthi trinitratis, grs. 20;
>   Decoct. papaveris, f ℨ i.

Use with an equal part of warm water four or five times daily. Shake well before using.

The specific medicines employed to combat the urethritis are such as are ordinarily prescribed in gonorrhœa.

The medicinal treatment of the arthritic or rheumatic symptoms leaves much to be desired. Salicylate of sodium, salol, and salicin have all had their advocates. But these drugs have not yielded that measure of success that might have been expected from them. Their palliative action is, if anything, less than their curative powers. Little can be claimed for them beyond the production of a temporary sudorific reduction of temperature. They seem neither to influence the progress of the disease nor to alleviate the pain. Quinine and iodide of potassium, used separately, conjunctively, or alternately, seem to give generally the best results. Quinine, if given in five-grain doses every four hours until its physiological effects are produced, controls the temperature and restrains the inflammation. The pain, especially the nocturnal exacerbation, seems to be lessened when fairly large doses of iodide of potassium are administered. The writer has never found colchicum of any value. When syphilis coexists the combination of mercury and the iodides has a decidedly beneficial effect.

Serotherapy, a comparatively modern method of combating septicæmia, is effected by the intramuscular injection of antistreptococcic serum. Tubes containing ten cubic centimetres of the liquid preparation are supplied by the British Institute of Preventive Medicine. The results of this mode of treatment have led to conflicting opinions. By some it is regarded as almost a specific, whilst others have been unable to satisfy themselves as to its pre-eminent value. The method is worthy of a more exhaustive trial in appropriate cases, such as those wherein the *Streptococcus* is presumably the predominant microbe. The arthritic or phlegmonous variety of gonorrhœal rheumatism would fall into this category.

The inflamed part must be put at rest. In cases of iritis this is effected by paralysis of the accommodation with mydriatics, by abstention from visual efforts and the wearing of a shade, or by confinement to a darkened room.

Fixation is required when a limb is affected. For this purpose some prefer the employment of plaster-of-Paris bandages. The drawbacks to this method are that the limb is apt to swell subsequently to its envelopment and that it precludes the possi-

bility of additional local treatment. It is a most useful and efficient appliance for securing complete articular rest when the more acute symptoms have passed off. Immobility may be gained by means of light splints, which permit visual inspection of the inflamed part and the application of sedative fomentations or counter-irritants. If the foot or ankle-joint be affected, great relief can be afforded by slinging the splinted limb in a Salter's Cradle. This apparatus allows the patient to shift his bodily position with comparative freedom from pain.

Glycerin and belladonna fomentations should be applied as hot as they can be borne, and changed every two or three hours. They are particularly useful and comforting in the cellulitic affection. Evaporating lotions, simple or with liquor plumbi added, are also in vogue. As a rule, warmth gives relief whilst cold intensifies the pain. Blistering is mostly employed for cases of fluid distention. Leeching and cupping of acutely inflamed parts are likewise enjoined by several authorities. Should suppuration occur in a joint, it must be opened and drained, under antiseptic precautions, as in an ordinary case of septic arthritis.

As to operative interference in gonorrhœal cellulitis there are diametrically opposite views. Since the usual termination of this condition is one of resolution, although it may have presented all the signs of impending or established suppuration, it is held by some that incisions are needless and unjustifiable. By others it is argued that the condition of tension, even though its nature be serous and not purulent, should be relieved by multiple punctures or incisions. A surface exit is thereby established for the toxin-laden fluid which would otherwise have to be reduced by systemic absorption.

The stiffness or deformity which remains after the subsidence of an attack may require treatment with hot-air baths, massage, manipulation, or it may be necessary to break down adhesions or work a joint under an anæsthetic. In certain cases tenotomy or the section of tense fascial bands may be called for.

The ophthalmic complications require long and patient treatment suitable to the requirements of the individual case, special care being taken to prevent the formation of iritic adhesions.

Fig. 1.—Temperature chart of a case of pneumonia following influenza.

THE PNEUMONIA OF INFLUENZA AND ITS TREATMENT BY SALINE INFUSIONS AND OXYGEN INHALATIONS; ACUTE ARTICULAR RHEUMATISM AND ITS CARDIAC COMPLICATIONS.

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THE PNEUMONIA OF INFLUENZA; TREATMENT WITH SALINE INFUSIONS AND OXYGEN INHALATIONS; DIFFERENCE BETWEEN RIGHT AND LEFT AXILLARY TEMPERATURES.

H. D., aged forty-one years, laborer, is brought before the class to illustrate certain points in diagnosis and treatment; also as an exhibition of what fidelity on the part of a resident in a hospital can accomplish. The case was what newspapers call " desperate," and that it terminated in recovery is largely owing to the skill and devotion of Dr. Light, the interne in charge, and to the care and intelligence of the nurse.

The temperature chart (Fig. 1) shows that when the patient was admitted, on October 26, his temperature was 101.4° F. During the day it rose to 102.4°. On the next day the temperature was 101.6° F. at 8 A.M., 103.2° at 11 A.M., 101.2° at 2 P.M., 100° at 5 P.M., 97.6° at midnight, and 96.8° at 8 A.M. the following morning. The temperature then rose again and at 4 P.M. had reached 102.6° F. It fell to 100.2° at 7.30 P.M., and remained at about 101° until the morning of the fourth day after the patient's admission, when at 8 A.M. it reached 103.4° and at 11 A.M. 104.4°. It fell after this, reaching 98.8° by 2 A.M. the next morning, and then oscillated between 99° and 103° for three days more. It then gradually subsided, reaching the normal on the morning of the eighth day, and for fourteen days was below normal in the morning, reaching the normal line as its evening height. The temperature chart thus

outlined indicates an infection and somatic reactions irregular in their resultant; the pyrexia first being high, then oscillating, and at last falling to the normal and even below it, without coincident recovery. In addition this chart shows a curious difference, for a certain period, between the temperature as taken in the right axilla and as taken in the left axilla. No local cause for this was manifest, and it was looked for but not found in the other patients under the same nurse and in the same ward. The difference varies between 0.2° and 1.2° F.

Many diseases show critical defervescence,—that is, the temperature, after ranging high for several days, suddenly, or at least rapidly, falls to or below normal. Acute lobar pneumonia is an example of this type, and either death or recovery usually takes place about the time of the critical defervescence. There are about seventy-five per cent. of recoveries and twenty-five per cent. of deaths in this disease when no treatment has been given. Treatment rarely decreases the mortality, and my friend Dr. Osler does not believe that it ever reduces it; I do. Sometimes in acute lobar pneumonia there occurs a pseudocrisis, a fall of temperature without a cessation of the other morbid processes, and in three or four days a true crisis occurs with cessation of all the acute and obvious phenomena of disease.

The patient with acute lobar pneumonia suffers from intense difficulty of respiration. His breathing is both quick and labored. Generally in connection with these marked symptoms considerable consolidation of lung tissue is found. There is massive parenchymatous inflammation involving a lobe or lobes, partially or entirely. This is what gives the name lobar and croupous to this form of pneumonia, in contradistinction to the form of pulmonary inflammation termed broncho-pneumonia, lobular pneumonia, or catarrhal pneumonia, which follows the distribution of the terminal bronchi and their lobules.

One may percuss and auscultate a chest and find that an entire lobe or more than one lobe is involved. The patient is markedly dyspnœic, the respirations are nearly or quite sixty per minute, the nasal alæ play, the lips are blue, the face is dusky and flushed, the pulse is fast and feeble, the heart labors, and death seems not far off. Suddenly amelioration begins, and in the course of a few hours the whole picture has changed. The temperature has fallen;

the patient is bathed in sweat. He takes full, slow breaths. The cyanosis has disappeared. The distress of the heart has vanished. The respirations are not half so frequent. Yet the physical signs remain practically the same.

Pneumonic consolidation, therefore, is not the sole cause of the distress in respiration. We are not dealing merely with physical obstruction, and the mechanical consequences upon the circula-

FIG. 2.
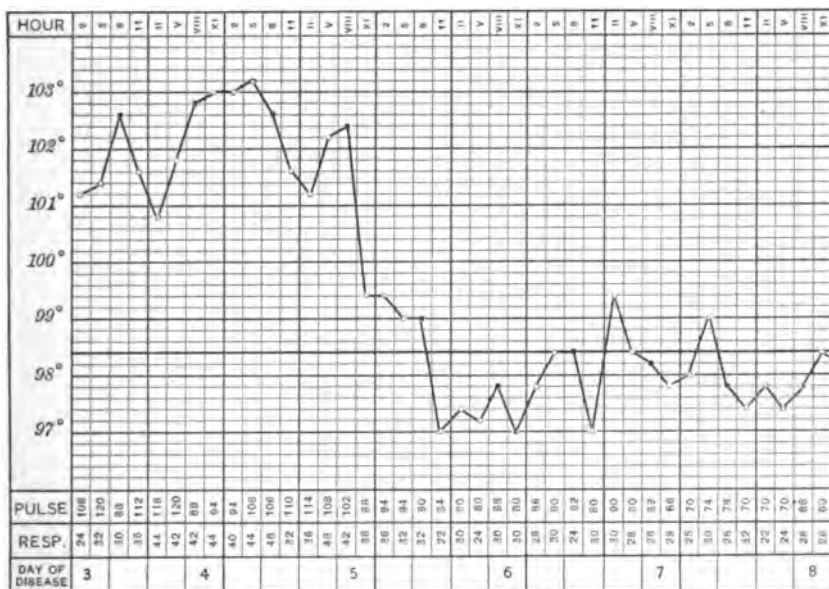
Temperature chart of an uncomplicated case of acute lobar pneumonia.

tion of the blocking up of the vessels in the air-cells, alveoli, and bronchioles. We are dealing with an intoxication, affecting very largely the nerve-centres of organic life, especially the respiratory centre. With the termination of the intoxication—by what means we do not know—that phenomenon of intense respiratory distress disappears. I show you a chart (Fig. 2) from a case of uncomplicated acute lobar pneumonia now convalescing in the ward, to illustrate critical defervescence; the whole process being complete in fifteen hours,—from 8 A.M. to 11 P.M. This chart may be contrasted with that of the patient before us who has recovered from the pneumonia of influenza. It shows a maintenance of pyrexia

until crisis, then a complete fall; as against the marked and irregular remissions and exacerbations of the chart of influenza. The temperature is subnormal only during convalescence. In the influenza chart it is subnormal during the course of the disease and for a much more prolonged period of convalescence.

The great point in the treatment is to oppose the toxæmia. The chemical products of bacterial infection must be combated as well as the physical processes resulting.

In regard to the patient before us, the intoxication from which he suffered was fluctuating and varying in intensity. The organism was at times almost able to overcome the toxæmia, at other times unequal to the task. The varying intensity of the morbid processes is exhibited by the temperature chart. This irregularity, this variability in the resultant of infection and reaction, is characteristic of influenza.

The changes in the degree or success of the resistance offered by the circulatory and respiratory centres as well as by the heat centre are apparent. The height of the temperature, if this be influenza, shows high resisting power. The fall of temperature before recovery shows lack of resisting power. The characteristic of the influenza toxin is that it is an intense depressant of the centres of animal life, and especially of the centre of heat production. It is a pathological antipyretic. The high temperature indicates the power of the patient to resist the disease. This is why antipyrin, acetanilid, and that whole class of drugs caused so many deaths when they were used freely in the treatment of influenza. The poison of the drug-shop was added to the poison of the disease, and lucky was the patient who survived the combination. The treatment of influenza is most successful when there is little evident tendency to subnormality of temperature with but few fluctuations and when the temperature maintains during the active period of the disease a height of 103° or 104° F. This temperature is favorable and normal in influenza, and it is folly to try to reduce it, especially by drugs. There is no disease in which the patient is so comfortable with a comparatively high temperature and so uncomfortable and unhappy with a depressed temperature. Sometimes we make the diagnosis of influenza from the tendency to subnormal temperature. Here is exhibited the difference between fever and pyrexia.

Let me read the ward notes concerning our patient. "His father died of influenza." There is no special family liability to the disease, or, rather, there is no family or general immunity. This is merely an interesting coincidence. "The patient's past medical history presents nothing of importance. His present illness followed an exposure to rain, and began with sharp, darting pain in the upper right chest and the epigastrium, which has continued unabated. Deep inspiration increases the pain and distress, but there was at first no dyspnœa. The patient was nauseated, and vomited the day before admission. There is no cough or expectoration. He complains of severe, throbbing frontal headache and has been constipated.

"On admission the patient's face is flushed and the superficial vessels are injected. His tongue is thick, flabby, indented by the teeth, and lightly coated. The pupils are equal and react promptly.

"The pulse is frequent, irregular, full, bounding, and dicrotic. The chest large and well formed. There is diminished expansion of the lower right chest and compensatory action of the left. The cardiac impulse and apex-beat are not palpable. The first apical sound is quick and muffled, and the second is accentuated. The pulmonic second sound is also accentuated.

"Examination of the lungs shows impaired vesicular resonance and increased vocal resonance over the right chest posteriorly. The breath-sounds are short and muffled. There are a few liquid râles in the scapular region and the axilla. Beneath the angle of the scapula on the posterior axillary line the sounds are harsh and bronchial in character. There are small liquid and bubbling râles beneath at the base. The sounds, however, are feeble in volume. Anteriorly, in the third and fourth interspaces internal to the nipple line, there is harsh and rough breathing, which almost suggests a friction-sound." What the resident heard, and noted in this frank manner of doubt, was a true friction-sound. "Resonance is impaired in these spaces and vocal resonance is increased. At the apex and in the infraclavicular space there is slight hyperresonance.

"The left lung shows compensatory exaggerated breathing over the entire lung. On percussion there was hyperresonance.

"The area of liver-dulness reaches from the seventh rib to one finger's breadth below the costal border. There is no abdominal

tenderness and no enlargement or tenderness of the spleen. The legs exhibit slight œdema."

To summarize what was found on physical examination: There was an indication of pleurisy on the right, with scattered areas of bronchial breathing, but with no very massive change. There were no very severe physical signs, although the patient was depressed and the temperature elevated. Later, when the temperature began to fall, there was an increase in the area of dulness at the right base, and both on the right and left new areas developed; with this went auscultatory signs of consolidation and increase in the respiratory rate. Cough and expectoration developed and dyspnœa became progressively severe. The signs of cardiac weakness increased, and the patient for several days was in a precarious condition.

Coming in with a pleurisy and slight catarrhal pneumonia, the patient while in the hospital developed either a massive lobular or a true lobar pneumonia. The latter is not infrequent in influenza. Mixed infection gives rise to mixed pathological anatomy.

In this case there was at no time rusty sputum. Rusty sputum does not necessarily occur in acute lobar pneumonia. I have made the diagnosis of acute lobar pneumonia in a number of cases without rusty sputa, the diagnosis in some of them, unfortunately, having been verified by necropsy. While such sputum is always a point in favor of the diagnosis of acute lobar pneumonia, its absence does not necessarily exclude that condition.

Tubercle-bacilli were not found in the sputum, but pneumococci were present. Owing to the absence of our bacteriologist, the influenza-bacillus was not looked for, as it can be demonstrated only by culture. But, though this demonstration was lacking, I had no hesitancy in diagnosis at the beginning and have none now.

The principal points upon which the diagnosis in this instance may be based are:

1. The headache, which is not necessarily a concomitant of acute lobar pneumonia or of pleurisy.

2. The comparative absence at first of physical signs proportionate to the respiratory distress. The toxin of influenza has a peculiarly depressing effect on the respiratory nervous system, so much so that B. W. Richardson proposed to call the pulmonary variety " pneumoparesis."

3. The temperature course,—its irregularity, its tendency to subnormality, and the fact that the patient was generally better when it ranged high and was more depressed when it was low.

4. The mixed character of the physical signs, pleurisy, bronchopneumonia, and lobar pneumonia coexisting.

Typhoid fever is a possibility, of course. This disease sometimes exhibits an irregular temperature course, and often begins with pleurisy, less frequently with pneumonia, catarrhal or croupous. The Widal agglutination test was made in this case and gave a positive reaction. This for a time made us fear that we had made a mistake in diagnosis, for, while we all make mistakes, we never like to do so, especially not when we are positive. But upon again questioning the patient we learned that he had had an attack of typhoid fever eight years before. The positive Widal reaction, therefore, was due to the old typhoid. Furthermore, the spleen was not enlarged, rose-spots were not present, and the diazo-reaction in the urine was not found. On the same day that the blood was drawn for the Widal reaction the following blood-count was made: red blood-cells, four million five hundred and thirty thousand; white blood-cells, twenty-five thousand four hundred; hæmoglobin, fifty per cent. The hyperleucocytosis is likewise against typhoid and in favor of acute lobar pneumonia. It is only fair to say, however, that in the pleuritic and pneumonic complications of typhoid fever the white cells increase, and perhaps this may be one of the earliest signs of complication.

There are various minor symptoms, which, however, I shall not take up, as I wish to leave the salient points firmly impressed on your minds.

Treatment.—In speaking of the treatment of a case that has recovered there is much liability to error. We know that we have pursued a certain line of treatment and we know that the patient has recovered, but we do not know that there is a logical connection between the recovery and the treatment, or, in other words, we cannot be sure that the patient would not have gotten well with other treatment or with none whatever. Indeed, I am sure that many patients recover in spite of treatment. In this lies the great fallacy of statistics. One observer tells me that he has treated a hundred or perhaps a thousand cases of pneumonia by local use of ice and that ninety per cent. have recovered. Another has bled all

his patients and ninety-five per cent. have recovered. All I can say is that both these gentlemen and their patients seem to have been very fortunate. And I ask nothing more for the reports of the results of my own treatment, although I have no routine. I do not believe in routine; each case is an individual study. It seems to me that the best plan would be to reason somewhat thus: This individual patient seemed to be in a dangerous condition. I did thus and so, and such and such changes took place, apparently as the result of the treatment adopted. In previous cases I have seen similar connection between treatment and change of morbid phenomena. I think there is a causative relation.

This patient was watched carefully and his temperature was not pulled down by meddlesome interference. Careful watching means much. In a prolonged illness I should prefer the constant attention of a good nurse to the occasional visits of a poor physician, or even of a good physician. The little things of the sick-room—heat, diet, ventilation, disinfection, etc.—are of great importance. Their neglect may defeat the wisest medication. Without any treatment at all seventy-five per cent. of all patients recover in acute lobar pneumonia and ninety per cent. in influenza.

Interference in influenza may increase the mortality more or less, according to the more or less dangerous character of the drugs used. Excluding the very young, the very old, and the previously sick and debilitated, good treatment should reduce the mortality of influenza to less than five per cent.; how much less I hesitate to say. In acute lobar pneumonia the mortality may be reduced to fifteen per cent., ten per cent., or, under otherwise favorable conditions, even so low as five per cent., if remedial measures are used judiciously.

The convalescent before us was put to bed in the spacious fever ward, given rest, warmth, and plenty of fresh air. He was sponged with tepid water twice daily. Internally he was given fifteen grains of sodium salicylate and twenty grains of sodium benzoate every two or three hours, with instruction to diminish the frequency should there be evidence of salicylism. Empirically this is good treatment for the pleurisy of influenza. If the salts mentioned are given in some solution of pepsin, they will be borne well by a stomach that will not tolerate the dose otherwise.

This patient, being constipated, likewise received Epsom salts,

which by draining the intestinal vessels is useful in cases of inflammation of serous membranes apart from constipation. Tincture of iodine was applied to the sore side. The chest was afterwards wrapped in a cotton jacket and a hot water-bag applied over this. My experience goes to show that local heat relieves pain and curtails inflammation in pleurisy better than does the local application of cold. When the pneumonic symptoms became more pronounced, calomel was given in doses of one-eighth of a grain every hour until a distinct "calomel stool" was obtained.

Ten grains of ammonium chloride with five grains of ammonium carbonate were given four times daily, alternating with the mixture of sodium salicylate and sodium benzoate. Strychnine in doses increased to one-thirtieth of a grain was given four times a day.

Later there was obstinate constipation with great distention and tympany, which did not yield to calomel, and the patient was given one drachm of magnesium sulphate, one-thirty-second of a grain of morphine sulphate, ten minims of dilute sulphuric acid, and one fluidrachm of essence of pepsin in three ounces of water every hour until there was a copious evacuation. This was merely an intercurrent treatment for an intercurrent symptom. Turpentine stupes or turpentine internally might have been used had this been ineffectual.

The patient's respiration becoming bad,—that is to say, not by reason of its frequency but its feeble and labored character,—oxygen was given frequently and persistently by inhalation. If one wishes good results from oxygen he must begin its use early, so soon as the symptoms are at all alarming. It should be given for twenty minutes at a time at the very least, and not less frequently than every second hour. If no amelioration ensues, the inhalations should be given constantly with no let up. I have administered oxygen without intermission for fourteen hours. I would not hesitate to do so for one hundred and forty hours. I wish to lay stress upon the *early* and *persistent* use of oxygen in acute lobar pneumonia of any origin when there is much respiratory distress. It is useless if one delays until the patient becomes moribund. It may fail to save life even when used promptly and sufficiently. It cannot revive the dead.

Sometimes the urinary secretion fails. In all fevers the urine should be watched; particularly is this necessary in pneumonia.

Whenever it fails, and often when it does not fail, hypodermoclysis with physiologic saline solution is useful and sometimes imperative.

Often in acute lobar pneumonia early venesection with saline infusion into the veins or under the skin is of great service. In some cases late venesection is also life-saving. The treatment of pneumonia by subcutaneous saline infusion was first instituted by Dr. Frederick P. Henry in this hospital some ten years ago. A number of foreign physicians have been accredited with this important therapeutic suggestion, but the honor is due to Dr. Henry. He was led to this method of treatment by noting the increase of the chlorides in the urine. He reasoned that this indicated the abstraction of chlorides from the blood serum, possibly in some process of chemical antagonism to the disease poison, and he replenished the blood-chlorides by saline infusion. About the same time Sahli advocated the introduction of saline solutions into the system in other forms of toxæmia. Some observers used it in puerperal infections. Immediately following Dr. Henry, I employed intravenous saline infusion concurrently with venesection in pneumonia, and extended the combined treatment with success to cases of uræmia and of delirium tremens, and also with good results used subcutaneous infusion without venesection in typhoid fever. I suggested its use likewise in acute phthisis and acute miliary tuberculosis. The method in its various modifications has wide application and is now of pretty general employment.

You may use sodium chloride, a drachm to the pint of chemically pure sterilized water, or you may employ one of the more complex solutions containing calcium and potassium chlorides, sodium sulphate, carbonate, and phosphate, etc. For prolonged use the latter are to be preferred; but in an emergency and if nothing else is at hand, you may use common table salt and tap water by filtering the solution through cotton and then boiling it. I personally employ it at a temperature of 100° F. The method of hypodermoclysis or venesection we will not take time to discuss now.

This patient recovered under the treatment narrated. Saline infusion was made but twice.

In regard to the use of strychnine a word may be said. Strychnine must not be given too early or in too large doses. It is needed as a reserve. One cause of Napoleon's success in warfare was that

he always kept some of his forces in reserve to be brought up at a critical moment. He lost Waterloo because his reserves did not arrive in time. There is here a double lesson. I like to use strychnine at the right time,—not too soon, but not delaying its use too long. Sometimes small frequent doses, at other times massive doses, even hypodermatically, are needed. It is, like all other matters of treatment, a question of good judgment under all the circumstances of the individual case. Strychnine used too long or in too large doses exhausts.

I have said nothing of alcohol. In this case it was not needed and was not used.

ACUTE ARTICULAR RHEUMATISM AND ITS CARDIAC COMPLICATIONS.

W. C., aged thirty-eight years, is a barber. This case cannot be exhibited for the result of treatment, because the patient has improved so rapidly that there has not been much chance for, treatment. He will serve, however, as a text for some remarks that I wish to make about acute articular rheumatism.

The patient, you see, is sweating profusely. The application of litmus paper to the skin shows the sweat to be acid. The perspiration in acute articular rheumatism is usually acid until recovery takes place. It was on this fact that the lactic-acid theory of etiology was built. This has largely been abandoned by modern observers.

Acute articular rheumatism is a disease *per se*. Many things are called rheumatism. Not every arthritis, however, nor even every septic arthritis or toxic arthritis accompanied with disease of the heart, is rheumatism. But a particular infection causing multiple arthritis, acid sweats, and frequently associated with disease of the heart, is known as rheumatism.

The diagnosis is important. Often after a sore throat there occurs inflammation of the joints and cardiac complication. This at one time was believed by some of us to point to a rheumatic origin of certain cases of tonsillitis. The same view was held in regard to pleurisy, because in some cases a pleuritis preceded arthritis with cardiac disease. Bacteriology, however, is forcing us to abandon the anatomical and to some degree the diathetic classification of diseases. We have various forms of infection and intoxication, due

to various pathogenic organisms, and the same infection may affect various organs and tissues, and the same organ or tissue may be infected by various organisms. There are certain predilections, certain affinities between germs and organs, germs and tissues, and these need to be considered; but the old nosology and the old etiology are in process of displacement; and meanwhile our terminology is in confusion. Especially is this so as regards rheumatism. There are many forms of infective arthritis, but distinctive features must be present to justify the diagnosis of acute articular rheumatism.

In acute articular rheumatism the larger joints especially are involved. The disease begins in the joints. There is a tendency to multiple involvement. The disease is ambulatory. It usually affects joints in parallelism or consecutively; corresponding joints on opposite sides or in the upper and lower extremities are affected simultaneously or in succession.

Whether any germ, or many germs, or only a few germs can cause arthritis, there is a particular germ which causes rheumatism. It is a specific infection, although the specific organism has not been satisfactorily demonstrated. A number of germs or poisons may produce arthritis, some monarthritis, others polyarthritis, but only one germ or poison produces the entire set of phenomena known as acute articular rheumatism. The term should no longer be used as a sort of scrap-bag for conditions that cannot be diagnosticated.

In acute articular rheumatism the condition of the heart is very important. The common cardiac trouble in most arthritic affections is not endocarditis or pericarditis or myocarditis, but *pancarditis*. The endocardium, the heart muscle, and the pericardium are all involved. One type may predominate, however.

We should always assume, in acute articular rheumatism, typhoid fever, influenza, diphtheria, and in most of the acute infectious diseases, that the cardiac muscle is involved, even if no special symptom thereof is presented, and we should apply treatment to prevent evil consequences. Most of the late myopathies have been found to be due to the non-recognition of the cardiac lesions occurring in the course of one of the acute infectious diseases. Especially is this true of influenza and of tonsillitis.

In this case upon admission the heart's action was evidently disturbed. A soft, blowing, systolic murmur was heard at the apex and at the base, both at the right and at the left of the sternum,

and likewise in the axilla, but not in the back nor in the vessels of the neck. The murmur was soft in character and low in pitch. There is a history of precedent attacks of acute articular rheumatism,—seven in the last fifteen years.

I am not prepared to say whether the murmur is recent or old. An old murmur is rough; a recent murmur is soft in quality. An old systolic, apical murmur is usually transmitted both to the axilla and to the back. A recent systolic murmur heard at both sides of the sternum and not transmitted to the neck is usually due to hæmic change or to myocarditis. The case must be watched to determine which it is in this instance. The patient may have both an old lesion and a recent murmur. His blood must be examined.

There is no friction-sound,—that is to say, no evidence of the throwing out of lymph in the pericardium.

As to the treatment of acute articular rheumatism, the first indication is rest. The second is to preserve the alkalinity of the blood. When the blood is kept alkaline, there is less liability to cardiac complications. The application of a successive series of light blisters over the joints and over the precordium is likewise useful.

Empirically we use salicylic acid and its compounds to control the swelling and pain in the joints. The joints are kept warm by wrapping in cotton or wool. A lotion of sodium bicarbonate and laudanum in glycerin and water sometimes relieves pain. I do not know why. Gentle inunction of oil of wintergreen is also useful.

In anæmic and old patients, and in subacute, chronic, and recurrent articular rheumatism, there is nothing better than tincture of chloride of iron.

To produce sero-alkalinity one may use sodium bicarbonate, sodium citrate, or almost any organic salt of sodium. It should be given freely. Potassium salts should not be used, as they add to the depression of the heart. After the urine has been made alkaline the sodium salt is to be given with that frequency and that dosage necessary to maintain the condition. It is best to reduce gradually. Sodium bicarbonate can be given at first in doses of one drachm in carbonic-acid water every hour; later, three times a day or once daily. If the urine is not made alkaline quickly by internal medication, inject two or three ounces or more of a sodium salt solution into the colon.

In this case sodium salicylate and tincture of the chloride of iron were given together.

A pharmaceutical expedient must be adopted to prevent the formation of the insoluble salicylate of iron, which occurs as a purple precipitate. To avoid this, the mistura ferri salicylatis of the Philadelphia Hospital Formulary was given. This is a mixture effected by means of ammonium citrate in the form of the liquor ammonii citratis of the British Pharmacopœia, which is given an acid reaction by the addition of citric acid. Glycerin and mucilage of acacia are also added to render the mixture unirritant. It may be flavored with birch oil or oil of wintergreen (methyl salicylate). It is compounded so that each teaspoonful contains:

Sodium salicylate	7.5 grs.	0.5	Gm.
Glycerin	15 ♏	1	C.c.
Mucilage of acacia	7.5 ♏	0.5	C.c.
Tincture of ferric chloride	7.5 ♏	0.5	C.c.
Oil of gaultheria	½ ♏	0.03	C.c.
Solution of ammonium citrate (B. P.), to measure f ʒ j		4	C.c.

The dose for acute cases in adults is two fluidrachms every hour or two until symptoms of salicylism occur. Then the medicine can be given every three, four, or six hours. This is kept up until convalescence, when it may be given three or four times a day.

This case should still be carefully watched to prevent serious myocardial or endocardial lesion. Most of the unfortunate sequelæ of rheumatism are due to want of care during and following convalescence. This is always slow and relapses are common.

Neurology

NERVOUS DISEASES AND PSYCHOSES FOLLOWING THE GRIPPE.

BY WM. BROADDUS PRITCHARD, M.D.,

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GENTLEMEN,—An incidental reference to the etiological rela-
tionship of grippe in a case of nervous disease presented to you
upon the occasion of my last lecture, has suggested a more extended
consideration of this subject. I doubt the existence of any single
condition, barring syphilis and trauma, equally prolific of morbid
mental and nervous states. Clouston, the eminent English alienist,
is quoted as stating that the nervous tone of the entire European
continent has been lowered through the effects of grippe. The
important part played by influenza in the development of diseases
of the nervous system can be readily understood if two well-estab-
lished facts are borne in mind: first, that the nervous system is
peculiarly susceptible to the inimical influence of toxæmic states,
and, second, that influenza or grippe represents a condition of
more or less profound systemic infection with bacillary toxins.

I shall not attempt to discuss the subject exhaustively, nor to
refer to the influence of grippe as a secondary or aggravating factor
in intensifying pre-existent mental or nervous disease. Nor shall
I refer to the nervous symptoms so conspicuous in the acute dis-
ease, especially in the febrile type, such as cephalalgia, neuralgia,
delirium, insomnia, etc.

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Of the nervous sequelæ of grippe, peripheral neuritis is, in my experience, by far the most frequent. Certain nerves seem especially liable to attack and, strange to say, the trigeminal, although the chief sufferer in the acute disease, is not one of them. The sciatic, the branches of the brachial plexus, especially the musculospiral, and the intercostal nerves are most commonly affected. Multiple neuritis is by no means unknown. Two instances have come under my own observation. But, contrary to what might be expected in toxæmic infection, peripheral neuritis is, in the majority of cases, unilateral. Another conspicuous feature is the involvement of the sensory rather than of the motor nerves. Pain, paræsthesia, and anæsthesia are prominent symptoms, while motor paralysis is rare, although a certain degree of localized motor weakness is invariably present. Degeneration of the nerve is not at all common, hence the alterations in response to electric stimulation are of the irritative rather than of the degenerative type. The symptoms are pain following the anatomical distribution of the nerve implicated, with paræsthesia, such as tingling, burning, numbness, etc., succeeded occasionally by diminution of tactile perception, and weakness of the corresponding muscles with resultant limitation of function, slight atrophy in some instances and occasionally other trophic disturbances, particularly herpes in the intercostal forms. The nerve is usually involved throughout its entire length. I myself was affected with sciatica, following an attack of grippe of unusual severity. The pain, with tenderness on pressure, extended from hip to foot. Through negligence, the symptoms persisted for many months. Unusual physical exertion of any kind was followed by marked aggravation of all symptoms, the leg felt heavy and was comfortable only when I was recumbent with the leg supported in a position of partial flexion. At one time contrast measurement showed atrophy amounting to three-eighths of an inch in the leg affected, and there was decided impairment of tactile sensibility. Under proper treatment the affection has entirely disappeared, illustrating the almost invariably favorable course pursued by these cases. Involvement of the musculospiral, the median, the ulnar, and the supra-acromial branches of the brachial plexus, is probably the most troublesome and persistent form of neuritis. This is doubtless due, in part at least, to the difficulty encountered in maintaining functional rest so

essential to speedy recovery. Next in value to rest is the preservation of an equable surface-warmth. This is best accomplished by swathing the affected part in lamb's-wool fleece. This fleece is supplied commercially in packages, put up in the same way as absorbent cotton. It is rich in lanolin, a fact which, I believe, explains in part its therapeutic value. It may be basted to the inside of the undergarments, and should be renewed every three or four days. Galvanism, though indispensable in treatment, is a two-edged sword, and, if used improperly, will greatly aggravate the neuritis. Faradism invariably does positive harm. The strength of the galvanic current should never exceed two or three milliamperes, and one milliampere, or even less, is best for the first two or three *séances*. The current should be continuous, and it should be introduced and withdrawn through a rheostat or controller. The length of the *séance* at first ten minutes or less in duration should be gradually increased to twenty minutes or half an hour. The entire nerve should be included in the circuit and the electrodes should be as large as can be conveniently used. Massage is useful as an adjunct, but in its application extreme caution and gentleness are also necessary at first. Medicinally I have great confidence in the following prescription:

> ℞ Codeinæ, gr. ¼ ;
>   Sodii salicyl., gr. iii ;
>   Quininæ sulph., gr. i.
>   One such powder three times daily.

Complete recovery in from three weeks to three months is the rule. A diet rich in carbohydrates is of great value.

Cerebral or, more often, cerebro-spinal meningitis is another comparatively frequent nervous sequel of influenza. In the New York Polyclinic, February, 1893, I reported a case of this kind and gave a *résumé* of the literature of the subject, embracing nine similar observations. I have since seen two additional cases. The disease occurred almost exclusively in adults, and in nearly every instance the onset was fulminant. The mortality was excessive (eighty per cent.). Convulsions were noted in only one patient, a child eleven years old. Eruptions were conspicuously absent. Another noticeable feature was the complete re-establishment, in the non-fatal cases, of nervous function. Oppenheim mentions an

influenzal encephalitis. I have never seen an instance of this nor of myelitis of the diffuse type nor of disseminated sclerosis, both of which are known to be often due to infectious processes.

Cerebral abscess, while always in a way accidental, deserves mention in this connection by reason of the frequency with which it follows the aural complications of grippe. Its symptomatology, prognosis, and treatment do not differ materially from those of brain abscess due to otitis arising from other causes. Prompt operative interference is here, as in all cases, imperative

Among the minor and less frequently observed nervous sequelæ of grippe, vertigo is to be noted. This is sometimes due to an intermediate ear affection, but in many cases it seems to be purely toxic. I have met three such cases.

The literature, both medical and lay, upon the psychoses following grippe is voluminous. Mania, melancholia, confusional insanity, and various forms of neurasthenia have been reported as due to this cause. Judging from personal observation, mania and confusional insanity are rare, while melancholia and neurasthenia are exceedingly common. The acute delirium of active, febrile grippe is, in a certain sense, a variety of mania, but this condition is a symptom or complication of the disease proper, and not a sequel. The diagnostic symptom-complex in ordinary melancholia consists of a mental state of more or less profound, progressive, unreasonably apprehensive depression attended by dulling of the cerebral reflexes, intensified subject-consciousness and paralyzed object-consciousness, with peculiar post-cervical or occipital distress, insomnia, and suicidal impulses, with or without delusions. There are accompanying somatic signs of varying intensity, torpor of visceral function, circulatory disturbances, and various vasomotor symptoms. We recognize at least three varieties of melancholia: the simple, the stuporous, and the agitated. In those cases in which mental apprehension is concentrated upon the viscera, the type is described as hypochondriacal melancholia. This may be associated with visceral hallucinations and collateral or sequent delusions. The type-tendency in post-influenzal melancholia is distinctly towards the simple hypochondriacal form. The agitated form comes next in frequency, the stuporous being comparatively rare. The symptom-picture is quite classic and presents few variations apart from the type-tendencies. This is not

remarkable in view of the fact that toxæmia, autogenous or ex-
ogenous, is a most potent factor in all forms of melancholia.   The
danger of suicide is no greater in this than in other forms of melan-
cholia.   The prognosis is distinctly better and the indications, so
far as the routine of treatment is concerned, are much clearer
than in the non-grippal disease.   The chief therapeutic indications
are isolation and forced nutrition.   This, with opium in the form of
the denarcotized aqueous extract or codeine, with non-debilitating
hypnotics, such tonics as strychnine, glycero-phosphate of lime or
soda, ferratin or Blaud's mass; galvanism in short daily *séances,*
one electrode over forehead, the other over the occiput, with or
without intestinal antisepsis as indicated, will effect a cure in
from six to twelve weeks.   Of course, trained attendants should be
constantly in charge of the patient.

Broadly speaking, every victim of grippe will suffer from post-
grippal neurasthenia also.   Lowering of nervous tone with in-
creased irritability of nervous function is the most striking residual
effect of the disease.   The only exceptions occur in some of the
non-febrile cases.   Languor of mind and body, emotional insta-
bility, paræsthetic sensory disturbances, states of mental anxiety,
of confusion, of notoriously irregular vasomotor and circulatory
function, with disturbed, fitful sleep, and vague pains in the head
and elsewhere, are among the symptoms of this morbid condition.
Patients are not benefited by travel.   The disease is not an im-
aginary one to be relieved by diversion of mind.   It is a state
of more or less profound toxic malnutrition, and it is amenable
to cure by proper treatment.   Rest is esential, but the form in
which it is to be prescribed varies radically with the sex.   The
majority of neurasthenic women are benefited greatly by rest in
bed, while men almost invariably are made much worse by this
measure.   It is rarely necessary or advisable for the male patients
to discontinue all occupation.   If not busy objectively he will be
subjectively, which is much more prejudicial.   Limit the amount
of work and eliminate the element of worry as far as possible.
Remove him from an atmosphere of domestic or business friction,
but keep him employed.   Guard against insomnia in both sexes
and force nutrition by administering a full diet.   Fresh cream
diluted one-half with milk has given excellent results in my hands.
The digestion, like all other functions, is below par in these cases,

and must be improved.   Voluntary exercise may be advantageously
replaced by massage.   The personal equation of the masseur is
important, and it may be necessary to change often before patient
and masseur are mutually suited.   Hydrotherapy intelligently ap-
plied is of great value, as is electricity.   Of drugs, opium in small
doses deserves the first place, one-tenth of a grain to one-fourth
of a grain twice or oftener daily, will dissipate sometimes, as by
a charm, the distressing mental state with its phobias and doubts.
The hypophosphites are most valuable tonics.   Alcohol is rarely
well borne or of benefit except with meals and well diluted.
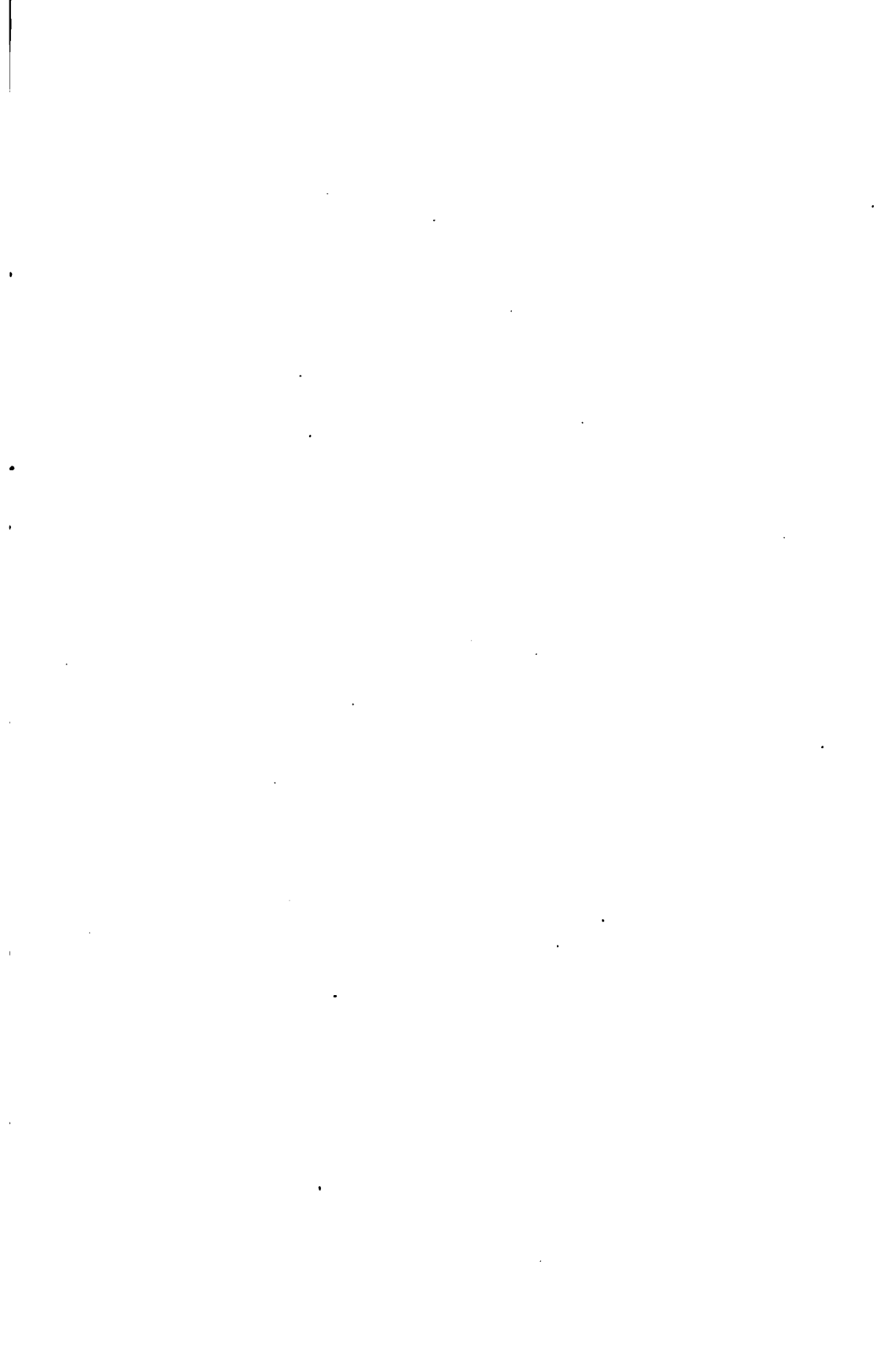
FIG. 1.—Epithelioma of the eyeball, seven months after operation.

FIG. 2.—Chancre of the lower lip.

Surgery

EPITHELIOMA OF THE EYEBALL; VARICOSE VEINS OF THE LEG, WITH CHRONIC ULCER (SPINAL ANÆSTHESIA); ENLARGED BURSA IN THE POPLITEAL SPACE; BLIND INTERNAL ANAL FISTULA; COMPOUND FRACTURE OF THE LEG; CYSTIC TUMOR OF THE FACE; CRUSHED FINGER; CHANCRE OF THE LIP; AMPUTATION OF LEG.

ABSTRACTS FROM CLINICAL LECTURES DELIVERED AT THE MEDICO-CHIRURGICAL COLLEGE, OF PHILADELPHIA.

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EPITHELIOMA OF THE EYEBALL.

CASE I.—Gentlemen, I take pleasure in showing you this man (Fig. 1), who was operated upon last March. The case was referred to me by Professor Fox, and was one of epithelioma of the eyeball. The operation consisted in removing the eye, both lids, and all tissues in the orbit. We are rewarded for having done so extensive an operation, as we see that there has been no recurrence in the seven months which have since elapsed. I wish to emphasize the fact that in operating upon malignant disease, unless you get beyond the proliferating tissue and remove it all, and along with it the so-called "invisible zone," you do no good, but rather harm, as you stimulate the remaining cells to an unwonted growth.

VARICOSE VEINS OF THE LEG, WITH CHRONIC ULCER OF THE ANKLE (SPINAL ANÆSTHESIA).

CASE II.—This man is suffering from varicose veins of the leg and a chronic ulcer of the ankle of twenty years' standing. He states that he is fifty-five years of age, but his general bodily

condition is nearer what we would expect to find in a man sixty-five years of age. He has a chronic ulcer of one leg, which he says has existed for twenty years, in addition to the varicose veins. Several years ago he was for some reason put under an anæsthetic, which he took so badly that he was told by his physician never to take one again. Examination shows that his heart is weak and probably diseased; Professor Anders says that there is no organic lesion, but speaks of it as "a weak heart." Inspection of the urine shows that the kidneys are slightly damaged; therefore, it is not only permissible, but best, that we use medullary narcosis rather than general anæsthesia. I am going to do what I said I would not do just yet in this clinic, and perform this operation under spinal anæsthesia, as the patient refuses to take ether or chloroform.

I take occasion to say that this is an American discovery, made by Dr. J. Leonard Corning, of New York, who called attention to the practicability of producing general anæsthesia by injecting into the subarachnoid space a sterile solution of cocaine. He also advocated direct medication in certain diseases of the cord. It was not, however, until this operation was done abroad and came back to us with European sanction that it made any powerful impression upon the profession. It was first taken up by Oberst and Bier, of Kiel, but the real credit of having popularized the treatment belongs to Tuffier, of Paris. We, as Americans, should support and recognize the claim of our countryman, Dr. Corniug, as being the father of this method of producing anæsthesia.

The first thing to do, after seeing that the field is perfectly sterile, is to locate the iliac crests. I will ask one of my assistants, whose hands are thoroughly aseptic, to locate these points; then I will have a line drawn between them. Tuffier does not draw this line; he says "draw an imaginary line," but why not draw a real one? I shall then have the iliac crests accurately located. Now I ask the patient (who is sitting up) to lean forward and place his arms upon his knees. This lifts up the laminæ of the vertebræ and increases the intervertebral spaces. In cases of scoliosis or deviation of the spine, it may be difficult to locate the spine of the fourth lumbar vertebra, which is our landmark.

I shall use fifteen minims of a two per cent. solution of cocaine, and will take from forty to sixty seconds in injecting it. It should

never be injected until cerebrospinal fluid can be extracted from the puncture. With the patient leaning forward, I at once locate the fourth lumbar interspace, and, with my finger on the spinous process of the fourth lumbar vertebra, I insert the needle, which should be fully three inches long, directly into the subarachnoidean space. You see that cerebrospinal fluid comes out drop by drop, unmixed with blood. Therefore the point of the needle cannot be elsewhere than in the subarachnoid space. Of course it has passed through skin, cellular tissue, the sacrolumbar muscles,—in fact, all tissues between the arachnoid and the skin. I now attach the syringe; it contains eighteen minims of a two per cent. solution of cocaine, which I slowly inject, taking at least one minute in doing so. Having injected fifteen minims of the solution, I remove the needle, cover the puncture with iodoform collodion, and over this place a pad of sterile gauze.

I will now ask Professor Anders to note the impression upon the pulse and respiration. In from four to six minutes there will probably be nausea, which may be followed by profuse emesis; this is the case in the majority of instances. There will doubtless be some acceleration of the pulse; respiration will also be slightly increased. In six or seven minutes the patient will probably say, " My feet are tingling; my legs are numb;" then the reflexes will be abolished. It has now been six minutes since the injection, and the patient says his foot feels asleep. The anæsthesia is partial and relative up to ten minutes after the injection, when, as a rule, it should be practically absolute and should last for an hour or longer, so that any ordinary surgical procedure can be completed under its influence. I think that I shall be able to say to this man, " Lift up your leg," and he will do so, and I can make the incision without his feeling it.

Formerly thirty minims of a two per cent. solution of cocaine were injected, but this was found to be more than was necessary; fifteen minims are sufficient. In my other case of spinal anæsthesia the nausea and emesis stopped about twelve minutes after the injection was made, being promptly controlled by giving pellets of ice. It was a case of tumor of the popliteal space. When I told the man to turn over on his stomach and was ready to begin operating, there was no further emesis. In thirty minutes the operation was completed, and in forty minutes the man was in bed and

felt perfectly tranquil. The profuse diaphoresis ceased in a short time.

It has now been eleven minutes since the injection in this case, and I want to demonstrate that, while sensation is gone, the patient still has the power of motion.

[The patient was told to lift his leg, which he did, elevating it at right angles with his body. Professor Rodman then made a circular incision around the leg, cutting through skin and superficial fascia, and, as the vessels were being caught up with hæmostats, the patient was asked if he felt anything, and replied " No." On again being told to lift up his leg, he did so. A few moments after the incision had been made and while ligatures were being applied to the severed veins, he turned to Professor Anders and asked, " when are they going to begin cutting ?"]

Gentlemen, the incision has been made, as you see, down to the muscular fascia, and the man has felt nothing at all. More than two-thirds of the cases vomit, and we are not at all surprised that some nausea is present here. It is better to have a bandage around the eyes, as we have in this case, as it is necessarily unpleasant for a patient to see an operation being performed upon his own person. You observe that the patient does not feel the needle as I put in the sutures, but that he complained of pain when a hypodermic injection was given him in the arm. Why? Because this anæsthesia is applicable only to operations below the diaphragm: we could not use it in operations upon the arm.

Now look at this foul ulcer at the ankle-joint. I shall make an incision around the edge and thoroughly curette the entire ulcerated surface. If anything would hurt, this would.

[While curetting the ulcer, Professor Rodman asked the patient if he felt any pain, and he answered, " No, sir; it feels as if some one was rubbing my leg."]

The operation was completed thirty-four minutes after the insertion of the needle. The patient was told that everything was over and he was ready to go to the ward, when he remarked that he had not been so free from pain as he was at this moment for twelve years.

The following is a summary of the patient's condition at different stages of the operation. At time of injection, pulse 120, respiration 20. Five minutes after injection, pulse 124, respi-

ration 28. Ten minutes after injection, pulse 140, respiration 24. Sighing respiration and slight nausea. Fifteen minutes after injection, pulse 92, respiration 40. Pulse small and weak. Patient feels that he must vomit; twenty minims of brandy were administered hypodermatically. Twenty minutes after injection, pulse 84, respiration 36. It hurts him to lie on his back; pain extends from puncture to shoulders. Twenty-five minutes after injection, pulse 88, respiration 36. Patient feels and looks comfortable; still pale. Heart sounds are clear; no murmurs. Twenty-eight minutes after injection, no nausea, patient laughing, color slowly returning. Thirty minutes after injection, pulse 90, respiration 36. Thirty-two minutes after injection, feels well, but tired. Thirty-four minutes after injection, pulse 100, respiration 36. Operation finished. Patient felt no pain throughout; asked several times when they were going to cut.]

Now, what are the possibilities from this on? He has withstood the immediate danger of the operation, but there are, of course, remote dangers after tapping the spinal canal. The spinal cord stops, properly, at the second lumbar vertebra, and this puncture is made in the fourth interspace; in other words, you throw this solution upon the cauda equina; and the possibilities are that, if we have been careless in our technique, or if the cocaine was not sterile, infection may result; but we do not expect it, as we have taken every precaution. There was no infection in my first case. The most important point in connection with this injection is to be sure of the cocaine. You cannot boil it. You can do the next best thing, however,—raise it to a temperature of 80° C. on several successive days. The solution comes ready for use in little glass ampullæ. There is just enough in one ampulla for two doses,—thirty minims. I drew eighteen minims into my syringe, but injected only fifteen. Now, if this is kept hermetically sealed, it should be sterile. The person from whom the cocaine is procured guarantees that it *is* sterile, so I feel that there is little to apprehend.

Now, gentlemen, I am glad to have given you this demonstration, and yet in a way I am sorry. I had made up my mind not to perform an operation of this kind in a public clinic, because I did not want any one to get the impression that I advocate the use of the subarachnoid cocaine injection in preference to chloro-

form and ether. Please do not quote me as advising this in general surgical practice. Here there was a good reason for using it. I am not willing to give it unlimited sanction at this time. In selected cases I will continue to use it at times, but I do not want you to think that I am allowing it to take the place of chloroform and ether.

Be sure to have a line drawn and to locate accurately the spinous process of the fourth lumbar vertebra; insert the needle one-third of an inch to the right of this, while the patient bends forward so as to increase the interspace, and the needle should go right in and the clear cerebrospinal fluid should flow out. Nothing could have been easier than the puncture was in this case.

[The patient was again shown a week later, during which time he had not had a symptom. He slept well the night after the operation, his appetite had been good, and the temperature had been practically normal throughout.]

ENLARGED BURSA IN THE POPLITEAL SPACE.

CASE III.—This man was operated upon a week ago yesterday, for the removal of an enlarged bursa in the popliteal space. Anæsthesia in this case was obtained by injecting thoroughly sterilized solution of cocaine into the subarachnoidal space, the needle of the syringe being thrust between the laminæ of the fourth and fifth lumbar vertebræ. The patient was perfectly conscious and able to talk during the operation, yet experienced no pain. When I asked him if he felt any pain while the sutures were being introduced, he said that he did not. Nausea began four and one-half minutes after the injection and lasted about ten minutes. The anæsthesia was absolute in ten minutes. Three-quarters of an hour after the injection the patient was in bed and perfectly comfortable and cheerful. Not a single unpleasant symptom followed, with the exception of a wakeful night, which was possibly due to the cocaine. His temperature has never been above 99° F., and the pulse has never reached 80 since the operation, when it was as high as 92. The wound has united by first intention throughout, and he is now ready to be dismissed. The puncture in the back was covered with iodoform collodion and sterile gauze.

BLIND INTERNAL ANAL FISTULA.

CASE IV.—This man has what is called a blind internal anal fistula,—*i.e.*, one with an internal opening into the gut yet no external aperture, which once existed but is now closed. Whenever you see a case of anal fistula, you then know that the patient has had an ischiorectal abscess. Such abscesses are either acute or chronic, very frequently the latter. Acute cases may be due to foreign bodies in the rectum, as a fish-bone or chicken-bone, which irritates the bowel, possibly perforating it; then the *Bacillus coli communis,* which is ordinarily a non-pyogenic organism, gets into the cellular tissue, where it becomes pyogenic and sets up a violent suppurative inflammation in the ischiorectal space. These ischiorectal abscesses may be tubercular, scrofulous, or chronic. Whatever the cause, there will be, in case of a complete fistula, an opening near the anus; it may be at its edge,—a marginal fistula, —or it may be anywhere on the buttock. You cannot tell what pus is going to do under the skin.

Fistulæ are anal or rectal. The former are usually marginal, the internal opening being near the anus. Rectal fistulæ, however, are more serious and the opening is usually to be found much higher up. The treatment of marginal fistulæ is very simple: a grooved director is passed through the external opening into the gut and brought out at the anus; all superlying tissue is then cut through with one stroke of the knife. Rectal fistulæ, where the internal opening is high up, cannot always be safely treated in this fashion. It may be, and often is, best to cut the external tissues down to the gut, and then, either with a strong silk or, possibly better, an elastic ligature, ligate the remaining portion of the tract. In this way hemorrhage is avoided.

This was, as I have said, practically a blind internal fistula. I opened an old cicatrix yesterday, and passed a probe high up into the gut,—I should say one and one-half inches. The internal opening is nearly always within half an inch of the anus.

I have asked Dr. Laws to bring his instrument for rectal examination, and we will inspect the rectum high up, and higher still the sigmoid, and see if there is not a little polyp there; I think that I feel one. The instrument being introduced, we now see very distinctly a polyp about the size of a pea.

In probing a fistula of this kind you must insert one finger in the bowel and with the other hand pass the probe through the external opening and endeavor to find the internal opening. Great care must be taken, however, not to make a hole in the gut. In cases where you are in doubt as to the existence of an internal aperture, you can inject a colored solution, such as permanganate of potassium, ink, or milk, into the external opening, and if there be an internal one the fluid will enter the bowel and pass out at the anus. Sometimes it takes a great deal of patient work to find the internal opening. I find that here it is about one and one-half inches from the anus.

I think it will be safe to lay open this sinus, and shall now proceed to do so. If you cut the sphincter in more than one place, incontinence of fæces may result. As you see, I have had some difficulty in stopping the hemorrhage, and so will leave these hæmostats on for a few hours and will pack the rectum lightly with iodoform gauze. Until you have had many such cases I would advise you to apply a ligature, instead of cutting high up as I did here. If I had simply cut down to the bowel and then ligated with a strong silk suture, it would have cut its way out in a week. The hemorrhage in this case was fully controlled, and in operations done in a hospital we feel less uneasiness about secondary hemorrhage.

COMPOUND FRACTURE OF THE LEG.

CASE V.—Gentlemen, here is a case such as you may be called upon to attend as soon as you enter practice. This man has just been brought to the accident room suffering with a compound fracture of the leg,—i.e., the skin is broken and the bone pushes through. The first thing to do in a case like this is to make the wound aseptic. Now I am going to show you just how to treat one of these cases. My assistant pulls on the foot while I make counter-extension by pulling on the leg. The next thing to do is to keep the wound from becoming infected, and to convert it immediately into a simple fracture. There is a great deal of hemorrhage from this wound, and the chances are that some vessel has been ruptured. I palpate the anterior and posterior tibial arteries below the point of injury, and by comparing them with the radial pulse I find that they are both uninjured. There is a

big hæmatoma here, caused by the rupture of some vessel, but, since the anterior and posterior tibial arteries are not injured, the nutrition of the limb will not suffer.

If you are called to see a man who has fallen in the middle of the street, don't stick your dirty fingers right into the wound; it is the worst thing you could do. Never put your fingers in a wound unless they are sterile. Cover it with a clean pockethandkerchief, hold the leg above the point of injury while some one else holds it below, and take the man to the hospital or to his home.

We first shave this leg, up to the knee; next sterilize the skin and get rid of any dead epithelium. Remember that always in the skin there are pyogenic organisms; they are particularly numerous around cavities of the body. I use bichloride of mercury here, because this wound was infected before the case came to us. Twenty years ago a surgeon would have cut this man's leg off at once. At that time the mortality in compound fractures was forty-five per cent. in the Pennsylvania Hospital, forty-eight per cent. in four New York hospitals, and sixty-five per cent. in hospitals of St. Petersburg. Amputation was nearly always performed after compound fractures, because the patients were likely to die of erysipelas, pyæmia, tetanus, etc. But it is now almost as easy to save such fractures as it is simple ones. No other field of surgery has had so much done for it by antiseptic technique as that of compound fractures. The mortality was less than one per cent. in one thousand cases reported by Dennis in the services of four large metropolitan hospitals, against practically fifty per cent. twenty years ago.

Having made this wound sterile by the injection of bichloride of mercury, we leave the rent in the skin open for drainage, and now dress the wound with sterilized iodoform, iodoform gauze, and finally plenty of sterile gauze. To do this properly makes the difference between the saving of a leg and losing it. Everything depends upon the care with which this first dressing is put on. He who thrusts his dirty fingers into a wound very likely causes the patient to lose his limb. We are going to put the leg in this Pennsylvania fracture-box and keep it there for seventy-two hours or longer, perhaps for ten days; by that time the wound in the skin will have healed, the fracture will have been converted into

a simple one, and we can put the limb in a plaster cast for six weeks.

[On the sixth day the dressing was removed and the wound found to contain blood, but completely sterile. After the fourteenth day, the wound having healed, the case was treated as one of simple fracture.]

CYSTIC TUMOR OF THE FACE.

CASE VI.—This patient has a little soft tumor on the face. It has been there for some time. As the skin is not red, it is not inflammatory; it is presumably a cystic tumor, and most likely sebaceous. Such growths are common on the face and still more so on the scalp. If you can, you should always remove these cysts without cutting into them. Therefore, I cut very slowly down *to* the cyst, but not *into* it. I use a very sharp knife, because with a dull knife one can never tell how much pressure one is using. Finding my diagnosis confirmed, and that I am dealing undoubtedly with a sebaceous cyst, I will enucleate it. Now, what is a sebaceous cyst? It is simply a tumor formed by the retention of the natural secretion of a gland. These cysts are frequently hereditary, and often multiple. When occurring, as they so commonly do, on the scalp, they are sometimes called wens. Remember that the cyst should be entirely removed. If you only incise it and evacuate its contents, the tumor is certain to reappear quickly, but, if you dissect out the entire cyst, you know it cannot recur. On the scalp you may find sometimes half a dozen of these sebaceous cysts. Now, in removing this little tumor we take the same aseptic precautions as we do in going into the brain. This is done with all wounds. We are going to close this wound with iodoform collodion, which makes a nice dressing for the face and avoids bandaging.

I think these little operations will be more instructive to you, as a rule, than more critical ones, as you may have to do them yourselves immediately after entering practice. You may be certain that, as beginners, you will not be called upon to perform major operations in surgery, and it is only by meeting the opportunities offered you that you can demonstrate your ability to cope with more serious cases.

In wounds about the face and scalp I am very fond of this dressing of sterilized iodoform collodion. Such a wound is first

sewn up, with a subcuticular stitch, or whatever kind of suture may be preferred, then a layer of sterile gauze is put next to the skin and painted over with iodoform collodion, ten per cent. In making this the bottle is sterilized first, next the crystals of iodoform are sterilized by putting them in a solution of bichloride of mercury, 1 to 500. You cannot sterilize collodion, but it is practically a sterile product. If you make iodoformized collodion from the powder, it will not be sterile: it always contains germs, and I know of no way to sterilize it. You can take the iodoform powder and test it, and find bacteria there always.

CRUSHED FINGER.

CASE VII.—Two weeks ago, when there was a young man here who had a badly mashed finger, I told you that we would make an effort to save it. I resected the joint and took away the distal end of the second phalanx, the proximal end of the distal phalanx, and some spiculæ of detached bone. We sterilized the part thoroughly with bichloride of mercury, and I told you then that the finger would do well. The wound has never suppurated, and I make good my promise by showing it to you to-day. Now, see how much better it is to have a finger like that than to have none. In the case of a laboring man particularly, save everything you can. We are constantly saving fingers like this here by treating them conservatively. You will recall the fact that before seeing this case I was told by the house surgeon that amputation would be necessary. I did not concur in this opinion, and therefore made a proper attempt to save the finger. In fact, it is very rare in my practice to amputate fingers. I have so often been rewarded with an unexpectedly good result where conservatism was practised, in young patients particularly, that it is only in cases where the life of the tissues has been crushed out by severe force that amputation suggests itself to my mind.

Union being complete, we dismiss this patient, with instructions to report again should further attention be required. He lives out of the city, however, and unless he finds it perfectly convenient to return to us again he should consult his family doctor. As the wound has not suppurated, it is not likely to give trouble hereafter.

CHANCRE OF THE LIP.

CASE VIII.—Here is a case which you probably have never seen before, and it will doubtless be some time before you see another. This man has on his lower lip a sore which is very hard, with firm edges and a punched-out or excavated centre. To my finger it feels like a buckshot under the skin. You notice at once that the man has enlarged glands under the chin. The cervical glands are also enlarged. One of the glands almost certain to be enlarged in a case of this kind is the epitrochlear. So it is.

What can this lesion be,—a solitary sore of the lip well below the mucous membrane, in a healthy young man thirty-four years of age? It has been there for two months, with no disposition towards healing. There are several possibilities. A sore on the lip of a man will probably make you think first of epithelioma, next of tuberculosis, though it is rare, and then chancre of the lip comes to your mind. Now, which is it? Why, it is a typical chancre of the lip. It is punched out, the edges are hard, and the submaxillary and postcervical glands are enlarged.

I have seen only two or three cases of chancre of the lip in men, and these were all caused in the same way,—by being shaved in a dirty barber-shop. Let this be a lesson to you, and always shave yourself. This chancre probably came from shaving over a little pimple, cutting its head off, and in this way infecting it. In females you will often find chancre of one lip, usually the upper, due to unmentionable practices. Now, in a very short time the signs of secondary syphilis will appear, which will make the diagnosis absolute. You should not have great difficulty in making a diagnosis between epithelioma of the lip and chancre. If this sore does not heal promptly under specific treatment, you will know it, because this patient will be brought back week after week until he is cured. We will probably not see a great deal of difference in the sore in a week, but in a fortnight or a month there will be considerable improvement locally, which, with the appearance of secondary syphilis, will eliminate all doubt. (Fig. 2.)

AMPUTATION OF THE LEG.

CASE IX.—The next patient, John M., twenty-three years of age, has suffered much of many surgeons. When eight years old

Fig. 8.—Amputation of leg, condition before and after operation.

he received a fracture of the tibia and fibula of the left leg, and ever since has suffered from a faulty union. The limb, as you see, is decidedly smaller and shorter than its fellow of the opposite side. It is also misshapen, and there is now distinct motion at the seat of fracture in both tibia and fibula. The two bones were not broken at the same level, the fracture of the tibia being about the junction of the lower and middle thirds, that of the fibula much lower down. The young man has become discouraged, and insists upon having his limb removed, as he has passed a large part of his life in the various hospitals of this city. At least nine operations have been performed. The fragments were rubbed together to excite formation of callus. Failing to secure union after repeated attempts of this kind, the ends of the bones were freshened, drilled, and held in apposition with stout silver wire. Although everything possible in the way of surgery seems to have been done,, and by the best of surgeons, his condition is such that he has despaired of getting a useful limb, and, after mature deliberation, has decided that he will not only suffer less, but more quickly and certainly become a bread-winner, by submitting to an amputation and then getting an artificial foot. In this opinion both Professor Mann and I concur. Our decision has been reached after repeated examinations, supplemented by carefully taken skiagrams. We have decided to amputate his limb at the point of election, so that he will secure the very best stump for an artificial foot. (Figs. 3 and 4.)

We will operate by what is known as the "modified circular method," and we prefer making internal and external skin flaps rather than anteroposterior ones. In this way the cicatrix will fall within the hollow of the artificial limb and not be pressed upon. This is an important fact.

The Esmarch bandage having been applied, we proceed to make the flaps. These consist only of skin and superficial fascia. Retracting the internal and external skin flaps, we now, with an amputating knife, cut the muscles on a level with the retracted flaps. We introduce between the bones a gauze retractor, which is so arranged as to prevent injury to the muscles while the bones are being sawed. The saw should be held in such a way as to sever the smaller bone first; in this way splintering is avoided. Having sawed through both bones, and, as you see, without splin-

tering, we remove a wedge-shaped portion from the prominent crest of the tibia. In my judgment this should always be done, as the crest is prominent, presses upon the stump, and might cause ulceration thereof. We identify and ligate the anterior tibial, posterior tibial, and peroneal arteries. Other and smaller vessels may require ligation when the Esmarch bandage is removed. Having now taken off the bandage, you see that the bleeding is almost entirely controlled, but a single muscular branch seeming to need ligating. I am struck with the fact that the arteries in this limb are unusually small,—certainly of less calibre than in any other limb that I have amputated. This, I am satisfied, may explain the want of union after repeated attempts made to secure it. The limb has never received the proper blood-supply. There being no further hemorrhage, we close the wound without drainage. Should any serum accumulate within the next forty-eight hours, it will find ready vent between the interrupted sutures we now introduce.

Formerly drainage was considered absolutely necessary after an amputation. I discarded the use of drainage-tubes in amputations ten years ago, and cannot say that I have had cause to regret it. I certainly expect primary union in this case. If, however, I were operating upon a mangled limb where I was doubtful as to the vitality of the tissues dealt with, I would feel safer were a drainage-tube inserted.

The wound having been closed by interrupted sutures of silkworm gut, we apply a copious dressing of sterile gauze and place the limb upon a posterior splint. I do this largely to prevent muscular contractions, which are so common after amputations of a limb. These contractions cause the stump to bleed more or less, are exceedingly painful to the patient, and certainly interfere to a degree with primary union. If they cannot be prevented, they are certainly lessened by using a splint and well-applied roller bandage. The stump, as you notice, is a very shapely one. Instrument-makers have repeatedly told me that the modified circular amputation gives the most satisfactory stump for the adaptation of an artificial limb. The dressing which has been applied will be allowed to remain for a week unless there should be a marked rise in temperature or other reason for changing it sooner.

FIG. 4.—Skiagraph of old fracture of the tibia and of the fibula of the left leg.

COMPRESSION OF THE BRAIN.

CLINICAL LESSON IN THE INSTITUTE FOR CLINICAL SURGERY OF THE ROYAL
UNIVERSITY OF ROME.

BY PROFESSOR D. B. RONCALI,

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GENTLEMEN,—Surgical operations on the brain and its membranes have become a definite part of our progressive modern surgery. Where formerly it was considered absolutely fatal to attempt surgical operation upon the contents of the brain case, we now know that surgical interference within the skull is accompanied by no more risk and requires no more exact precautions than operation within the other cavities of the body. The evils that result from compression of the brain are well known and the necessity for preventing them is very clear. There has always existed, however, a certain hesitancy with regard to the indications for operation. Some very conservative surgeons insist that it is only when definite localizing symptoms of compression are present that operations upon the skull itself are justified. There is also a question as to whether operations should be done whenever a depression of the skull exists, even though there may be no external wound, or whether we should let the patient run the risk of the sequelæ that so often ensue. It is this question that we will discuss to-day.

The patient to be presented to you this morning furnishes an excellent illustration of successful surgery for long-standing compression of the brain, and we shall study the case in detail because of its clinical interest and its typical character. The patient is a boy of seventeen, a native of Rome, who came to the clinic on the 17th of March, two years ago, for the cure of an interesting affection in his central nervous system. His family history is excellent. His father was a very robust man, by occupation a public porter, who died as the result of severe abdominal injury. His mother is living and well and has always enjoyed good health. He has one

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brother, who is employed as a mason and is endowed with herculean strength. Before the accident which happened to the patient when he was nine years of age he hád always been well, having never suffered even from the ordinary diseases of childhood. There is no trace of syphilitic heredity in the family.

The personal history is simple enough. About eight years ago the boy, while playing with some companions in the public street, was run down by a carriage that was moving rapidly. His head was caught between the hub of the wheel and the wall at the side of the street and was compressed severely. The boy was found lying on the ground insensible, with a copious stream of blood flowing from a wound in his head. He was taken in a comatose condition to the hospital, where a fracture of the cranium, with some sinking in of the fragments, was recognized. As there were at the time no symptomatic indications of compression of the brain, trephining was not done, and the surgeons limited their interference to a thorough disinfection of the soft parts and the bringing of them together. Curiously enough, though the wound was inflicted under such apparently unfavorable circumstances and there seemed to be so many opportunities for infection, the lacerations healed almost by first intention. This must be taken, I suppose, as an indication of the thorough resistive vitality of the healthy child's tissues. Twenty-four hours after his entrance into the hospital the boy came out of the coma, and after a few days the wound in the soft parts healed completely, leaving only a firm cicatrix, with some inward sinking of the tissues, the result of depression of the underlying bone.

For five years after his discharge from the hospital there seemed to be very few, if any, physical symptoms of the lesion. There was occasional localized pain in this side of the head, which continued to recur despite treatment of various kinds. His mother considers that as a result of the accident he has suffered from some diminution of intelligence. Before he received the wound he was always joyful and ready in his responses. Afterwards he became melancholic, even to the point of remaining by himself in one place for several hours, and sometimes showed a lack of sequence in his ideas. His memory also, according to his mother, was much weaker than before the injury.

About a year ago, some six years after the accident, epileptic attacks set in, which presented the following characteristics: They

began with contractions in the hand and the left arm. After this contractions of the muscles of the face and especially of the mouth occurred, the mouth being drawn towards the right side. The patient's head at the same time was always bent towards the right side. Following these contractions came others in the muscles of the left leg, and then the boy, if he were not supported, fell to the ground. During the attacks there was a copious flow of saliva through the mouth. The mother has observed that the muscular contractions always remain localized to the left side of the body,— never becoming generalized. The "fits" lasted from six to eight minutes, but the patient did not come to himself for three-quarters of an hour, or even longer, after an attack. Stammering was noted just before and also after the epileptic seizures. The intervals between the attacks varied. The patient's second attack occurred eleven days after the first one; the third and fourth attacks followed at intervals of about ten days. Afterwards the "fits" came on very irregularly,—once in six days, once in five days, then in eight days, and then in four days. For a while the attacks recurred every second day, but they ceased to be as frequent as this and occurred every eight to ten days. There have been periods of from thirty to forty days between attacks. The mother has never noted two seizures on the same day. The most interesting fact in the history is the observation that the convulsions always begin with some difficulty of speech.

Inspection of the patient shows that the cranium is dolichocephalic and there is no defect of development. Looked at from in front we find, however, that there is a decided asymmetry in the parietal region, caused by a distinct sinking in of the cranial bone in this locality. Part of this fossa is covered by cicatricial tissue. The asymmetry involves not only the parietal region, but also in its anterior portion a part of the frontal bone of the same side. The depression is somewhat ovoid in shape and has about the dimensions of a five-lire piece (silver dollar). The skin over it is of normal color and is for the most part covered with hair. The deeper portion of the fossa is covered by a cicatrix of white pearly color and of semilunar form, with its concavity towards the occiput. The cicatrix is not a simple linear mark, but has two or three branches, which show that there must have been considerable laceration of the scalp at this point.

The face of the patient seems perfectly normal. The eyes present nothing unusual: the pupils are equal and promptly react to light in both eyes. The ears are well formed, but the cartilage of the right ear is much more prominent than that of the left. The mouth when closed seems perfectly normal, but when the patient is asked to smile it can be seen that the nasolabial fold on the left side is a little less pronounced than that on the right. When the patient is asked to close his eyelids forcibly, it can be noted that the right eyelid contracts and closes with more force than the left. When the eyelids are held forcibly shut, it is easier to overcome the resistance of the left eyelid than that of the right. There is no appreciable difference in size of the muscles of the limbs nor of the two sides of the body.

The patient's head shows no abnormalities to palpation and is not tender on pressure except for a slight sensation of pain which is aroused when considerable force is exercised directly over the site of the old wound. The posterior margin of the site of the old fracture is rough and presents a ridge that extends over a large part of the fracture. Under careful palpation of the arms and legs the muscles of the left side of the body seem to be less firm and more flaccid than those of the right side. Percussion of the cranium elicits absolutely no difference of sound in the different parts.

Careful measurement shows a distinct difference in size of the two arms. The circumference of the right arm at the middle third is twenty-one and a half centimetres; that of the left arm at the same place is twenty and one-half centimetres. At the upper third the right arm measures twenty-two and a half and the left arm twenty-two centimetres. The circumference of the right leg at its upper third is forty-two centimetres, that of the left leg is forty-one and five-tenths centimetres; at its lower third the right leg measures thirty-nine and the left leg thirty-eight and five-tenths centimetres. These are, however, probably no more than the normal differences of the two sides.

None of the patient's movements in any of his limbs are interfered with. Flexion and extension, abduction and adduction of legs and arms can be accomplished absolutely normally. There is less muscular force on the left side than on the right, but this is to be expected. The patient walks naturally and can walk a straight line without any oscillation. With eyes closed he can go backward or

forward readily and without trepidation. There are no Romberg symptoms.

The patient's psychical condition is interesting. He is now and is habitually calm. He has very little taste for companionship of any sort. While in the hospital he usually remains lying on his bed without exchanging words with his companions. He keeps his head covered with the bedclothes a good deal; often with only a portion of his head appearing from under them he stares vacantly out without saying anything. When he gets up to walk around, he does not look for companionship. His countenance is melancholic and there is a distinct lack of intelligence about it. He always answers questions promptly, however, no matter how sudden or unexpected they may be, and always answers them directly and to the point. In his speech there is some hesitancy in the articulation of certain sounds,—sometimes to the extent of rendering words difficult of pronunciation unintelligible. He is easily irritated, and if any one disturbs him is apt to make known his displeasure not only by signs but also by complaints. As we have already noted, his mother thinks that there has been a distinct diminution of his memory since the accident.

The study of the craniocerebral topography is of extreme interest. When the position of the fissure of Rolando is determined by D'Antona's method, it is found that the diagonal line on the skull which indicates the position of the Rolandic fissure divides the depressed portion of the skull into two unequal parts. The larger part lies anterior to the fissure. The larger cicatrix partially overlies the ascending frontal convolution. The ascending parietal convolution lies immediately beneath one of the small extensions of the cicatrix which we described as occurring in conjunction with the main scar. The depressed portion of the skull, then, may be considered to press upon the lower two-thirds of the fissure of Rolando and upon the ascending frontal and parietal convolutions. The compression involves also the end of the third frontal convolution.

The diagnosis was Jacksonian epilepsy as the result of compression by the trauma and the subsequent cicatrix in the right frontoparietal region. The state of affairs in the skull, the notable depression, the assurance that there was an internal cicatrix, and the distinctly localized nature of the epileptic aura and symptoms, encouraged the belief that an operation would afford relief. For

this purpose the patient was kept in the hospital. For thirteen days he was constantly under observation. Not once during that time did he suffer from any epileptic symptoms. During the fortnight, except for some of the psychical symptoms that we have noted, he was in excellent condition. All his vegetative functions proved physiologically perfect and his urine was entirely normal. He had no elevation of temperature.

The operation was done under combined narcosis of chloroform and morphine. A curvilinear incision was made through all of the soft tissues down to the bone. This incision began about two finger-breadths above the highest point of the ear and was carried forward and upward over the parietal and frontal bones to the glabella. Then, with a Macewen periosteal elevator, the pericranium was separated from the skull, to which it was so closely adherent that small laminæ of bone remained attached to it as it was raised up. These splinters were carefully detached, and the flap of soft tissue, consisting of periosteum, muscle, and skin, was turned downwards upon the cheek. After this, with a small trephine, the bone to be removed was punctured at several points, and then separated from the rest of the skull with pincers. The portion of skull taken away was about eight centimetres long and five centimetres wide. The bone was found to be slightly adherent to the dura mater along the line of the fissure of Rolando, and certain openings were found in the dura from which the cerebro-spinal fluid escaped. The portion of skull removed was found to be very much roughened on its inner surface. It bore a series of prominences to which the dura was adherent. In the middle of the fragment of skull there was found a ridge of thickening, in the midst of which were osteophytes that made the inner surface of the skull very rough. This ridge was due to a process of productive osteitis which followed the fracture of the inner table of the skull seven years ago. It was this ridge and the irritating presence of the osteophytes that determined the cerebral compression to which must be attributed the development of the epilepsy.

The dura mater was of normal aspect, had a physiological color, and was not thickened in any part. No hypertrophic development of its vascular system could be found. The brain pulsated everywhere except over the part corresponding to the third frontal convolution. As Professor Durante thought that the failure of pulsa-

tion at this point might be due to some cystic collection in the brain substance, he enlarged the opening in the skull slightly in this region and punctured the part with a hypodermic syringe. The result was negative, however. After the enlargement of the bony opening and the puncture all the brain began to pulsate normally, and it was considered inadvisable to proceed farther.

For three days the patient had a postoperative course without incident. The temperature was normal, despite the fact that there was a good deal of vomiting immediately after the operation and that he was greatly inconvenienced by thirst. His bowels and urine were normal, and on the third day he wished to sit up in bed and was only with difficulty persuaded not to do so. He complained of but slight pain in the region of the wound. The pulse, respiration, and temperature continued perfectly normal.

On the fourth day after the operation the patient had a convulsive attack, which, according to the nurse in attendance, did not develop farther than a passing contraction of the nasogenial fold of the left cheek. This contraction afterwards became noticeable in the muscles on both sides of the face. These spasmodic movements were very fugacious, and were followed by some moans and sighs on the patient's part, and afterwards by distinct cries for his mother to come and help him. About ten hours later there was a second attack of the same kind, at which I was present. When the symptoms noted were compared with those which had been related by the patient's mother, there was no doubt that we were assisting at the development of the epileptic aura which always preceded the convulsions before the patient was operated upon.

On the sixth day the patient had a third attack, which, like the other two, developed no farther than the epileptic aura. Examination now showed that the wound had all healed by first intention except where union was interfered with by the presence of gauze. Union was so firm that the underlying brain tissue was pressed upon by the gauze, and it was doubtless this that had caused the epileptic form seizures. After redressing there were no further epileptic incidents. In the evening following this redressing the patient was in excellent humor and engaged in quite an animated conversation with his companions in the ward, something that he had never done during his fortnight in the hospital before the operation. His pulse, respiration, and temperature continued absolutely normal.

Two days later (eight days after the operation) it was noted that the patient was sensibly better in every way. He was especially much more intelligent than he had been at any previous time since the accident about seven years before. This fact was noted by all his friends. He ate with appetite and began to want to move around, not caring to remain in bed. His general condition was so good that he was allowed to put on his clothing and pass some time in the garden. His improvement continued, though considerable sero-hemorrhagic fluid continued to escape from the operation wound. For this compression was applied, but without removing the dressing. As the flow of serum continued two days later, the bandages were removed, and the operation wound was found to be entirely healed except at a small portion of its lower angle. The surface of the cicatrix was pressed so as to expel any liquid that might have collected, and then the margin of the slight opening left in the soft tissues was touched with nitrate of silver.

Fifteen days after the operation the bandages were removed and everything was found to be perfectly healed. The patient was cured of his epileptic attacks, at least for the time. Besides this, surgical intervention accomplished such an amelioration in the psychical condition of the patient that he is now quite a different man and this alone would have justified the operation. There is now no hesitancy in the patient's replies, as there was before, and he has lost his melancholic expression and his solitary ways. Now he wants to jest and tell stories with his companions in a way quite unusual to him, as he has said himself and as he never did before the operation.

For several months past the patient has come back occasionally to report as to his condition. He has continued in excellent health and spirits and has had no recurrence of his epileptic seizures. It is not impossible that he may have some further attack, because, even when the source of irritation is removed, if the nervous tissues have formed the habit of suffering from the nervous explosions that characterize epilepsy, they do not easily unlearn it. That the patient has at least been greatly benefited there can be no doubt.

The most interesting question with regard to a case like this, however, is not whether operation may benefit when done years after the original injury and when epileptic attacks have continued

for some time, but whether the operation for the lifting of the skull and the consequent prevention of the deleterious pressure should not have been done when the accident happened. It seems a good rule always to trephine whenever there is fracture of the skull with depression of the fragments. This rule holds good even when there are no lesions of the soft parts and no localizing symptoms of cerebral compression. The compression and irritation of the cerebrum by a depressed osseous fragment may be tolerated for a long time, and yet after a lengthy interval serious symptoms may develop.

All the best authorities in brain surgery are of this opinion. Brokaw, Dehuise, Le Fort, Lucas-Championnière, Pozzi, Agnew, Chiene, Keen, Durante, Casselli, D'Antona, A. Broca, and Maubrac admit the extraordinary tolerance of the brain to external pressure, and yet insist that there is an absolute indication to trephine, if only for prophylactic purposes, whenever there exists depression of the skull, even without wounding of the soft parts.

Despite this agreement of the highest authorities, there are those who do not accept the views enunciated. There should be no surgical intervention, they say, without further indications,—first, because very often the patient who is suffering from a fracture of the cranium is in a comatose condition, and operation under these circumstances is liable to do more harm than good; secondly, putting aside the contraindication of coma, trephining can never be justified unless there are other symptoms demanding it, since it is wrong to expose the patient to the immediate risks involved in the operative procedures and the danger of infection afterwards simply to guard against a remote and uncertain danger.

As to the assertion that trephining during coma is contraindicated, there is absolutely no good reason for thinking so. Indeed, instead of being harmful, Broca and Albert insist that it is rather an advantage. In depressed fractures without wounds of the soft parts coma, far from being a contraindication, is a positive indication for operation. As Broca says, if the coma is dependent on bony compression of the brain, trephining will save the life of the patient. If the coma depends on diffuse cerebral lesions, the trephining does not make his condition any worse, as the case is practically hopeless anyhow. Clinical observations of Langenbeck and others have shown that in cases of wounding of the cranium

trephining during coma has nearly always been followed by imme-
diate return of consciousness.

With regard to the second objection, the possibility of infection,
this, fortunately, has less and less weight as our technique for intra-
cranial surgery becomes better. No surgeon hesitates now to do an
exploratory laparotomy, or even a thoracotomy, whenever serious
symptoms are present and there seems to be any prospect of afford-
ing relief. Surely the brain surgeon need have no fear of seeing
his patient die from infective meningitis now that infective peri-
tonitis under similar circumstances is so rare. We are just as able
to guard against meningitis as against peritonitis, pericarditis, or
pleuritis. Besides, if the primary operation of trephining be neg-
lected, a secondary operation will often be necessary. Practically
all surgeons are agreed that secondary trephining is much more
dangerous, especially as regards the possibilities of infection, than
the primary operation. The reason is that the tissues which have
long been subjected to chronic irritation possess less resistive vitality
than do the healthy tissues just after a wound has been inflicted.

A. Broca and Maubrac make some very practical observations
with regard to this matter. They say, " When we compare a large
series of cases of traumatic epilepsy, we find a considerable number
in which the origin of the trouble is a depression of the skull without
external wound. The same thing happens in certain cases of trau-
matic mania. As we shall see, operations later on, when every one
is apt to think them opportune, are far from giving constant suc-
cess. The immediate danger is greater, because it is then necessary
to open the dura mater and often to excise from the brain cicatricial
masses more or less considerable in size. Later intervention does
not always put an end to the convulsive seizures or to the mental
troubles. It is much more prudent to trephine immediately, with
the almost absolute assurance of preventing ulterior accidents,—epi-
lepsy, mania, etc.,—in the case of those who would have suffered
from them without the operation, and with the consciousness of
not injuring those who would have escaped such sequelæ even with-
out operation."

In recent years a rather startling scientific opinion has been
advanced against the necessity for using the trephine. It is that
of Adamkiewicz, of Vienna. In a series of experiments upon
animals he was able to demonstrate that the encephalon is very

tolerant to even high pressure. He concludes, then, that there is really no such thing as compression of the brain, and that the symptoms which are usually pointed out as indicating the existence of this condition are really signs of functional disturbance of the cerebrum caused by other influences than the compression. Trephining as a remedy for compression of the brain he does not consider to have any value, since cerebral compression has no real existence. He thinks that, in place of proceeding at once to trephine because of a blind fear of the spectre of cerebral compression, the surgeon should in these cases turn his attention to pathological conditions that have a real existence, and especially if he does everything possible to secure absolute repose for the tormented brain, relieving the febrile symptoms and thoroughly disinfecting any wounds that already exist. Needless to say, this opinion is contradicted by the clinical experience of all the authorities in brain surgery. If Adamkiewicz's experiments on animals justify any such conclusion as he draws from them, it certainly cannot be permitted to apply to human beings.

With regard to surgical intervention in traumatic lesions of the cranium we may draw the following conclusions:

First, that immediate trephining should be done whenever a depression of the skull exists, whether this is accompanied by a solution of continuity of the soft tissues or not.

Second, that the unusual faculty of compression possessed by the nervous tissues and their tolerance of pressure under certain circumstances should not induce the surgeon to delay trephining. Even though the compression may not produce symptoms at once, it is sure to have a hurtful effect upon the brain sooner or later.

Third, that in cases of depressed fracture of the skull there is never any need to wait for localizing symptoms to manifest themselves. Secondary trephining often either cures only for the time being or entirely fails to cure. This failure depends, first, on the fact that the nervous elements have contracted such a habit of morbid explosive activity that the convulsions continue to recur in spite of the removal of the cause which first produced them; and, second, the degenerative processes set up in the cortex as the result of compression become inveterate, and a complete return to the original physiological condition cannot be hoped for.

Fourth, that coma, in place of being a contraindication to immediate trephining, is really an indication.

Fifth, the dangers of immediate trephining are less to be feared than those of the same operation done later, because in the first case infection, if it takes place, will be only extradural, as a rule, while in the second case there is risk of intrameningeal or intracephalic infection.

Sixth, the therapeutic results of immediate trephining are excellent. The results of the secondary operation are often incomplete, nearly always unsatisfactory, and sometimes, instead of producing amelioration, are followed by aggravation of the symptoms.

Seventh, in cases of depressed fractures of the cranium in the new-born which occur as a consequence of obstetric manipulation, craniectomy should be done, even though there may be no localizing symptoms. In a word, the rule as to immediate elevation of any depression of the bony vault of the cranium holds good for all ages.

A NEW AND SIMPLE METHOD OF STERILIZING CATGUT BY BOILING; ALSO A NEW METHOD OF STERILIZING SPONGES BY BOILING. AN APPLICATION OF A WELL-KNOWN CHEMICAL PRINCIPLE TO THE STERILIZATION OF MATERIALS FOR SURGICAL OPERATIONS.

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I. A NEW METHOD OF STERILIZING CATGUT.

It is generally acknowledged that we have not as yet a thorough, easy, and practical method of sterilizing catgut. In most of the procedures in general use the catgut is sterilized by prolonged immersion in dilute antiseptic solutions. The methods of von Bergmann, Lister, Braatz, Martin, Kocher (juniper oil, Macewen (chromic acid), etc., are of this kind. Reverdin, Kümmel, and Lauenstein have described procedures for the sterilization of catgut by dry heat, but the complicated apparatus and prolonged observations of the temperatures required render the methods too troublesome for general use.

Various procedures have been recommended for sterilizing catgut by boiling. Unfortunately, the simplest and most thorough method of disinfection—the boiling in water or in watery solutions without previous preparation—has been hitherto impracticable, as the catgut at once swells up and becomes fragile and useless. König recommended boiling in cumol, Brunner in xylol, Dowd, Fowler, and others in alcohol, Saul used carbolic acid and alcohol, Hofmeister, Cunningham, and others employed formalin. Most of the fluids that have been recommended or their vapors are inflammable, and many of them have a low boiling-point so that they have to be boiled under pressure. For this purpose complicated apparatus is necessary; hence the procedures are not suitable for general use. Considerable experience is required for the proper sterilization of catgut with formalin; the gut has to be carefully stretched after

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it has been immersed for various lengths of time in the solution, and the results obtained are not constant, as the catgut is often brittle and useless.

Based upon theoretical considerations, I have devised a method of sterilization of catgut by boiling, which laboratory and clinical experience has shown to be simple, practical, and thorough. It is a well-known, though not sufficiently well-recognized, principle that organic and inorganic substances are insoluble in solutions of those drugs by which they themselves are precipitated from their solutions. Thus, albumin is completely precipitated by ammonium sulphate, and hence albumin must be insoluble in concentrated solutions of ammonium sulphate.

FIG. 1.
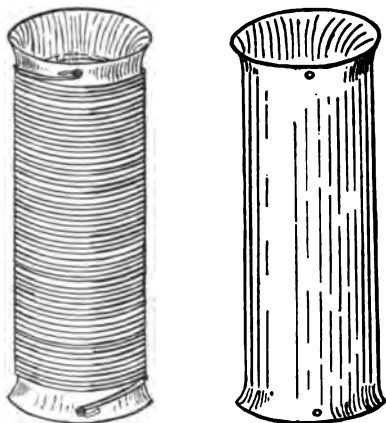
Glass spools for catgut. The one to the left is wound with catgut, the other is without catgut. Two-thirds natural size.

Commercial catgut is freed from fat by immersion in ether or chloroform for from twenty-four to forty-eight hours. I use a mixture of one part of chloroform and two parts of ether, as this combination has great penetrating power and chloroform itself has antiseptic properties. Catgut which has thus been freed from fat can be kept in the dry state by simply allowing the chloroform and ether mixture to evaporate.

When the catgut is to be sterilized, it is first wound in single layers, and as tightly as can conveniently be done with the fingers, on glass spools. I have found glass spools of the pattern of the accompanying figure to be useful. These can be made by any glass-

blower. They have a small perforation at each extremity, into which the ends of the catgut are to be tied so that they cannot loosen or unravel.

By adding ammonium sulphate to boiling water until no more will dissolve, a saturated solution is prepared which boils at 108° C. or 226° F.,—a very high boiling-point, as will be observed. In this solution the spools are boiled for from ten to thirty minutes, and when removed with sterile forceps are shaken and washed for one-half to one minute in warm sterile water, carbolic acid, or sublimate solution. By this means all the very soluble ammonium sulphate which has remained adherent to the catgut is washed off, and the gut is now ready for immediate use or for preservation in strong alcohol.

The catgut thus prepared will be found to have lost none of its physical properties. It remains of the same size, is soft and pliable, does not swell up, and thin threads of it are often stronger than catgut prepared by other methods. It is absorbed in the body between the fourth and the eighth days.

Bacteriological examinations have proved that the catgut is always sterile after it has been boiled for five minutes. The accompanying table shows the results obtained in this respect with coarse catgut threads which had been infected with *Staphylococcus aureus,* with catgut bacillus *a* (Brunner), and with anthrax bacilli and spores. The time required for sterilization can be shortened to from three to ten minutes by dissolving the ammonium sulphate in a solution of carbolic acid (one or two per cent.). This is also shown in the table.

Sterilized ligatures which will remain in the tissues unabsorbed for four weeks may be prepared by boiling the catgut in a mixture made by adding ammonium sulphate to a 1 to 1000 aqueous chromic acid solution until saturated.

The solutions can be used repeatedly, as the ammonium sulphate on cooling crystallizes out unchanged and can be again dissolved by heat. An excess of the salt does no harm. It is only necessary to add fresh water to replace that which has been evaporated. The catgut can be boiled repeatedly for fifteen minutes (from three to six times).

Catgut prepared in this manner is well borne by the tissues of the human body. It has been used by a number of colleagues here

BACTERIOLOGICAL TESTS.

Coarse catgut threads which had been immersed in bouillon cultures of the bacteria for twenty-four hours were dried at body temperature and then boiled in the solutions. They were afterwards washed in sterile water, cut into very small pieces, and dropped into nutrient bouillon.

BACTERIUM.	Boiled in a saturated solution of ammonium sulphate in water. (Temperature 108° C.)		Boiled in two per cent. carbolic acid solution saturated with ammonium sulphate. (Temperature 108° C.)	
Catgut bacillus *a*	Control	+ +	Control	+ +
	2 minutes	+	1 minute	—
	5 minutes	—	3 minutes	—
	10 minutes	—	5 minutes	—
	15 minutes	—		
	20 minutes	—		
	25 minutes	—		
	30 minutes	—		
Staphylococcus aureus	Control	+ +	Control	+ +
	1 minute	+	½ minute	+
	2 minutes	+	1 minute	—
	3 minutes	—	2 minutes	—
	4 minutes	—	3 minutes	—
	5 minutes	—	4 minutes	—
	10 minutes	—	5 minutes	—
	15 minutes	—		
	20 minutes	—		
	30 minutes	—		
Staphylococcus aureus from phlegmon of forearm.	Control	+ +	Control	+ +
	1 minute	+	½ minute	+
	2 minutes	+	1 minute	+
	3 minutes	—	2 minutes	—
	4 minutes	—	3 minutes	—
	5 minutes	—	4 minutes	—
	10 minutes	—	5 minutes	—
	15 minutes	—		
	20 minutes	—		
Spores of bacillus anthracis grown at temperature of 28° C. for forty-eight hours. Killed at room temperature by five per cent. carbolic acid solution in three and one-half days. Killed by steam at 100° C. in three or four minutes.	Control	+ +	Control	+ +
	1 minute	+	1 minute	+
	3 minutes	+	2 minutes	+
	5 minutes	—	3 minutes	—
	10 minutes	—	4 minutes	—
	15 minutes	—	5 minutes	—
	20 minutes	—		
	30 minutes	—		
Bacillus anthracis and spores. Killed by steam at 100° C. in two or three minutes.	Control	+ +	Control	+ +
	1 minute	+	1 minute	+
	3 minutes	+	2 minutes	—
	5 minutes	—	3 minutes	—
	10 minutes	—	4 minutes	—
	15 minutes	—	5 minutes	—
	20 minutes	—		
	30 minutes	—		

+ + = profuse growth; + = growth; — = no growth.

and abroad with very satisfactory results, and I have used it almost exclusively in private and hospital practice during the last eight months.

Briefly stated, the procedure consists of the following:

1. Catgut freed from fat is tightly wound on appropriate glass spools, the ends being firmly tied so that the gut cannot loosen or unravel.

2. The spools are boiled from ten to thirty minutes in a saturated solution of ammonium sulphate in water or, for chromicized catgut, in a 1 to 1000 watery chromic acid solution.

3. The spools are agitated for at least one-half minute in cold or, better, warm sterile water, carbolic acid, or sublimate solution.

4. They are preserved in strong alcohol.

II. A NEW METHOD OF STERILIZING SPONGES BY BOILING.

It is generally recognized that for the rapid and thorough removal of blood, pus, or other fluids during operations sponges are often indispensable. Their softness, elasticity, and porosity, the ease with which they absorb fluids, and the readiness with which they yield them on pressure, have given to sponges a unique and valuable place in our surgical armamentarium. Sterilization by boiling—the simplest and most thorough method of disinfection—has been hitherto impossible, because boiling in water, soda, or other antiseptic solutions causes a loss of elasticity and a shrinkage of the sponges and renders them useless. The methods of preparing them for surgical use now in vogue are so complicated and unsatisfactory and require so much time and labor that sponges have to a great extent been replaced by gauze pads, although the absorptive and detergent power of gauze is decidedly inferior to that of the sponge.

As a result of a series of investigations into the physical and chemical properties of sponge material, and based on chemical principles identical with those made use of in the sterilization of catgut by ammonium sulphate, I have devised the following method by which sponges can be sterilized by boiling and yet retain their advantages as cleansers.

Sponges consist mainly of an albuminoid material called spongin, which is precipitated from its solutions by a fluid containing two per cent. of tannic acid and one per cent. of potassium

hydrate. According to the chemical principles previously referred to, it was believed that spongin, and therefore sponges, might be boiled in this solution without their undergoing any change. This was found to be the case: the sponges after being boiled for any length of time were found to have retained all of their physical qualities,—size, softness, elasticity, power of absorption, etc.

The solution of potassium hydrate and tannic acid can be used repeatedly, as it does not deteriorate by boiling or by age; it is only necessary to add fresh water to replace that which has evaporated.

Sponges thus prepared are of course sterile; furthermore, bacteriological investigations proved that the sponges were free from living germs even after they had been infected with some of the most resistant bacteria and their spores.

Sponges that have been used for an operation can be resterilized, if so desired, by washing them in water and boiling them again.

Briefly stated, the steps of the procedure are the following:

1. The sponges are freed from calcareous matter by immersion for twenty-four hours in eight per cent. muriatic acid solution and thorough washing in water.

2. They are boiled for fifteen minutes or longer in a solution which contains two parts of tannic acid and one part of caustic potash to every one hundred parts of water.

3. The sponges are then squeezed and washed in sterile water, carbolic acid, or sublimate solution until all of the solution of potassium hydrate and tannic acid—which is of a dark brown color—is removed.

4. They are preserved in three to five per cent. carbolic acid solution.

The writer ventures to recommend these two procedures as rapid, reliable, and thorough methods of sterilizing catgut and sponges by boiling. By the first method any one can at little expense prepare sterile catgut for himself, without complicated apparatus and without previous experience. It is only necessary to follow out carefully the directions given. The writer hopes that the simple method of sterilizing sponges above described will enlarge their hitherto somewhat contracted sphere of surgical usefulness.

SUPRAPUBIC CYSTOTOMY.

BY EDMUND W. HOLMES, A.B., M.D.,

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In the days of surgical uncleanliness and rapidity of operation, before asepsis and anæsthesia were known, the favorite route for extraction of vesical calculus was through the perineum, the professional leaders measuring the time of delivery of the stone by seconds. The dazzling brilliancy of the procedure and the comparative rarity of individual occasion prevented the average practitioner from attempting the operation, and drove those thus affected to the great surgical centres. If attempted in the outlying districts, the most disastrous results sometimes followed, and it is certain that the recorded perineal operations, in the hands of the masters, by no means represent the total mortality. This is equally true of crushing for stone. Bigelow's litholapaxy—overcoming the aversion of the patient to being cut, and dispensing with the need of a knowledge of the anatomy of the pelvic outlet on the part of the general practitioner—has replaced the keen, rapid thrust of the lithotomist with the far safer, slower, plodding method of cumbrous intravesical crushing; thus exchanging the danger of hemorrhage, sloughing, areolar infiltration, and impotency for the chance of cystitis, shock, or ether death from prolonged anæsthesia. Bigelow did mankind a great service by abridging the mortality of the older lithotrity as well as of ill-advised attempts at perineal lithotomy, but he has given us in their place an operation, in spite of its excellence, whose dangers in unpractised hands are not sufficiently recognized.

The treatment of intravesical diseases has always been handicapped by the lack of knowledge of the exact condition present. The x-ray now prevents our cutting for an absent stone, and differentiates between ureteral and vesical calculus, but fails as to other morbid conditions, while the endoscope has thus far proved a dis-

appointment. Were the records complete, the negative as well as the positive side of cystic stone would prove an interesting chapter. The occasions in which a stone is present but the diagnosis is uncertain until confirmed by the Röntgen method are not rare, which uncertainty is likely to be obviated altogether under the intelligent application and perfected technique of the x-ray; unfortunately, the cases are still numerous where the existence of the stone is not even suspected through the lack of the classical symptoms, and these complexities will continue until the x-ray is employed as a routine practice in all vesical troubles.

As physicians we are too prone to be satisfied with a single diagnosis; with a mitral lesion, we look no further for tubercle or syphilis; found a contusion of the buttock, we overlook the fracture of the jaw; and so in bladder troubles, having determined the presence or absence of a stone, we are satisfied, without regard to other lesions which may coexist. No one who has experienced the anxiety of the treatment of complicated vesical disorders can fail to appreciate the exactitude of suprapubic section as compared with the uncertainty of litholapaxy or the blindness of the perineal cutting. It is almost needless to say that in rapidity of operation it rivals the perineal in most hands, while in brevity of duration it is far ahead of crushing.

In the past the greatest obstacle to opening the bladder above the pubes was sepsis. It should be remembered that healthy urine in itself is harmless and to be feared only as a fluid nidus for infection, and even if ammoniacal, not greatly to be dreaded if free from saprophytic or pyogenic germs.

In all intravesical operations a preliminary washing of the bladder *per urethram* with ten per cent. boric solution for several days is valuable, care always being taken not to elevate the irrigator too much on account of some risk of rupture of the bladder. At the time of the operation a six-ounce colpeurynter inserted into the rectum may be distended with air or water and then six or eight ounces of boric solution injected into the bladder, and a steel sound introduced, with handle depressed so that the point will project towards the line of incision, this fluid being retained by encircling the penis with a tape. Many operators dispense with the sound or the rectal bag or both. When the urethra is occluded by a stricture, the quantity of retained urine will be

increased by the stimulating effect of the ether upon the kidneys, which will thus take the place of the boric injection.

The patient is placed in the dorsal decubitus, with the shoulders and head slightly raised and the thighs apart. The surgeon standing to the right, an incision two and one-half inches long is made in the median line, between the pyramidales muscles, from above downward to the upper edge of the symphysis. Gradually deepening, the space below the peritoneum is recognized, the prevesical fat being sometimes very scanty. Care should be taken in determining the position of the peritoneum, which may be adherent, may occupy an unusually low position, or may not have been lifted away by insufficient distention of the bladder or rectum. The bladder itself is recognized by the sense of fluctuation and by the large veins upon the surface. Seizing it with a tenaculum, the left forefinger is placed against it and used as a guard to guide and follow the blade, which, with its edge downward, is thrust through the vesical wall, the finger filling up the aperture as it is cut, and, if the subperitoneal space be small, enlarging downward even below the upper plane of the symphysis. The bladder walls must not be bruised with hæmostats, but strong silk sutures passed through either lip of the incision will be of great utility. If necessary, the fluid or urine may be drawn off with a long-nozzled syringe before the primary puncture is enlarged. In closing up, fine catgut should be employed in the submucosa with a second row in the muscular and fibrous coats; rubber drainage may or may not be placed at the lower angle of the abdominal wound, which is sutured according to the habit of the operator. If pus is present in the bladder, it should be kept drained below by a soft catheter in the urethra carefully watched under the most rigid asepsis. If drainage above is desirable, a soft unfenestrated rubber tube may be used through the suprapubic opening, the patient lying on his side; but if for flushing for a considerable time or for permanent urination, Keyes's rubber suprapubic tube or Horwitz's metal contrivance with a screw cap may be employed with advantage, and for cleanliness, free drainage, and control far surpass the perineal methods.

Those who have not attempted the suprapubic operation hardly appreciate its simplicity, the satisfaction to the surgeon of intelligent supervision of each step, the thoroughness with which the bladder can be explored from above, and the facility afforded for meet-

ing complications which may not have been suspected previous to the operation. For all uncomplicated cases of stone in the bladder, not too large or too hard, presenting conditions which can be overcome without rude instrumentation of the vesical wall, and in a period not exceeding twenty minutes, without obstruction in the urethra interfering with the introduction of instruments, where the patient is not at the extremes of life,—neither too young nor too old,—we prefer litholapaxy; in all other cases, or where there is a doubt, we advise suprapubic lithotomy. Even in enlarged prostate, before such radical operations as Bottini's cauterization, or castration, the exact determination of the condition of the prostate and the surrounding parts are thus better ascertained, and in a " Bottini," render its performance careful and accurate. In very feeble old men in whom the condition forbids too active interference or where it is actually imperative, where the patient is tortured by frequent and painful micturition, even as a palliative, suprapubic drainage affords immense relief and may be performed under local anæsthesia, Schleich's No. 2 being employed. Physicians in general are sadly neglectful of this means at their hands in the above-mentioned class of patients.

In impermeable stricture of the urethra with stone in the bladder, suprapubic removal with posterior catheterization is certainly advisable, while in impermeable stricture of the deep urethra alone, the " happy-go-lucky" incision into the perineum cannot be too strongly condemned, the Wheelhouse operation, or the suprapubic with posterior catheterization, being far preferable. In chronic irritability, in sacculated bladder not too great and not projecting too far back of the prostate, in tubercular or non-malignant tumors of the bladder, in extreme enlargement of the prostate which may or may not subsequently require vasectomy, orchidectomy, or cauterization, in cancer or other obstructive conditions, especially where other methods have failed and relief in urination is demanded, and, lastly, in all circumstances of doubt, when intelligent inspection and palpation and ready access are desirable, and unrestricted approach needed, the suprapubic route offers the best assurance of operative success.

Obstetrics and Gynæcology

OBSTETRICAL ANALGESIS OBTAINED BY COCAINE INJECTIONS INTO THE LUMBAR ARACHNOID.

BY A. DOLÉRIS, M.D.,

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ANALGESIS of the subumbilical portion of the body, obtained by injecting cocaine into the lumbar arachnoid, is taking an important place in surgery, and this method probably will in the future render signal services in urgency operating, on battle-fields or in country practice, where time and assistants are lacking. I shall not refer to the various gynæcological operations that I have performed with its help; the method is specially serviceable in this department of surgery, in which I have found it completely satisfactory. But I wish to speak of the obstetrical domain, in which its usefulness appeared to be self-evident. The prospect of being able to obtain painless labor was such an attractive one that I was naturally led to make experiments in this direction.

M. Cadol, Dr. Tuffier's assistant, did not succeed in convincing the accoucheurs, for whom he specially wrote, of the safety of the lumbar injection, in spite of the already large table of statistics on which he based his assertion. I, however, had greater faith in the security of an analgesic method that had already been well tested by the surgeons, and of which the technique seemed *a priori* neither difficult nor dangerous, and I was anxious to aid in conferring the benefits of this method on obstetrics.

My first experiments were made with the greatest prudence, the dose of cocaine used being almost insufficient; little by little I gained reliance, and had no occasion to regret having done so.

The average dose (one centigramme) and the maximum used (two centigrammes) are far below those employed as a regular thing by some surgeons at the present time, and physiological experimentation gave me ample authority for not being afraid of such amounts.

Furthermore, when I took up the problem of obtaining painless labor, I was well aware that the circumstances were new and might be dangerous, since I had to deal with many conditions that do not exist in surgical operations,—the special state of pregnancy, presence of the fœtus, uterine contractions, preservation of voluntary effort for expulsion, possibility of hemorrhage, of retention of the placenta, etc. On this score, however, I was reassured by the results obtained in my first five cases, which were chosen with the greatest care, and in which cocaine was used only because the pains were excessive, pathological in a way, and which would otherwise have necessitated the use of chloroform.

Since then my experience has become more varied, and I have used the method in cases of dystocia and obstetrical surgery, in addition to ordinary cases of labor, and I have had twenty-five such cases followed in full detail. My conviction on the subject is now definitely formed, and I have no doubt that that of my colleagues will likewise be so before long. I think I can safely say (1) that obstetrical analgesis can be obtained with certainty by lumbar injections of moderate doses of cocaine; consequently, painless labor can be procured at the accoucheur's pleasure, even in the most painful stage of parturition; (2) that cocaine administered in this way is a valuable agent in another way, as it usually hastens labor; (3) that it appears to be a hæmostatic; (4) that the drawbacks to its use in this way are trifling, and that the risk to mother and child from the method amount to nothing.

In my first publication on the subject I said that the indications for the method were the same as for the use of chloroform in confinement, but at that period I was erring altogether on the side of prudence. I now think that this analgesis can be used with a large number of women in confinement; labor being always a painful process, cocaine does away with the suffering with certainty, stimulates contractions, shortens the whole process, and lessens the loss of blood.

If these indications seem too extensive,—as they apply not only

to primiparæ but also to multiparæ, who have less suffering and shorter confinements to apprehend,—it will at least be granted that primiparæ have a right to benefit by the process, as their suffering is always acute and in many cases very severe.

The question, however, arises whether the restriction based on the length of labor and severity of suffering will be able to be maintained. It is more than probable that, as soon as people are convinced that the method is harmless, it will be very difficult for an accoucheur to refuse it to a patient who is suffering badly, whether she be primiparæ or multiparæ; and, since its action is as perfect as possible with multiparæ, the process is likely to enter rapidly into general use.

I shall not go into the details of the *modus operandi,* which have been recently published elsewhere, with all the necessary developments.[1] I make the injection with a Luër syringe into the third, fourth, or fifth lumbar space. The patient should be seated on the edge of the bed, with her knees apart and body bent forward. But, as this position is not always advisable with a pregnant woman, I have in some instances made the injection in lateral decubitus or in the knee-and-elbow position. In the latter attitude the puncture is very easy, but the certain indication given by the flow of the liquid from around the spinal marrow is lacking. The puncture should be made at the end of a contraction; in this way you have time to get it done before the next contraction comes along. The puncture causes hardly any pain. If you wish you can cocaine the skin before making the puncture, but this is really not necessary.

I have used solutions of one and two per cent., sterilized and prepared beforehand in little glass bulbs hermetically sealed, which are opened at the moment of using. The amount of cocaine injected varied at first from one-half to two centigrammes, but at present I use a uniform dose of one centigramme.

During my first experiments I made the injection at all stages of the period of dilatation; but now, in order as far as possible to carry the confinement through without pain and without repeating or increasing the dose, I prefer to make it when the orifice

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[1] Tuffier, Semaine Médicale, May 16, 1900; Legueu and Kendirjy, Presse Médicale, October 27, 1900.

has reached the size of the palm of the hand with primiparæ, and a little less with multiparæ. In occipito-posterior positions I even think it better to wait a little longer. But these are only general indications, and not absolute rules, as you must be guided particularly by the degree of suffering.

Analgesis is obtained in from three to ten minutes after the puncture, generally in five minutes, with loss of sensation to the waist or ribs. The analgesis of the uterus is complete: not only does the woman not feel the contractions, but she is absolutely unconscious of the process of labor.

The contractions increase in intensity, length, and frequency; this increase is very manifest and appears together with the analgesis. The contractions become very energetic, last from two to four minutes, and follow each other very rapidly. When they occur, the cervix remains supple, and complete dilatation is reached very quickly. The period of expulsion is very much shortened, for several reasons,—on account of the increase in uterine contractions, the relaxation of the vaginal muscular fibres, and because the patient makes more powerful exertions as she does not suffer. For this reason, her voluntary efforts must be directed by the accoucheur, who tells her when a contraction comes on, and warns her to bear down. Still, in some cases the patients feel a vague sensation in the pelvis, with an inclination to bear down, occurring at each contraction, particularly when an hour has elapsed since the injection.

Placental delivery takes place rapidly, some ten minutes after birth. In some instances I noted immediate and almost spontaneous delivery. Loss of blood is very moderate and often quite absent. In seven or eight cases it was impossible to find enough blood to weigh; in the others the average loss was from one hundred to one hundred and fifty grammes. The womb after delivery is hard and contracted.

Finally, when three hours have elapsed after birth, the postpartum follows a usual course. There is no change in involution; convalescence and lochia are as usual. In only one instance was there any rise of temperature; in that case the thermometer rose to 38.4° on the evening following the confinement.

As to the headache, which Tuffier noticed in ninety-five per cent. of his cases in the hours following the injection, I observed it in

only seven cases out of eighteen, and even then it was always slight and yielded to antipyrin. This remedy was successful in each case, a fact that I think has not yet been pointed out.

Vomiting, on the other hand, is almost constant with these patients. It generally comes on from five to ten minutes after the injection and is preceded by nausea; but, as a rule, it is not abundant nor is it painful; its duration is between two and eight minutes. It is sometimes accompanied by congestion and perspiration of the face. A quarter of an hour after confinement all these symptoms disappear and the patient feels well disposed and comfortable.

The foetus does not appear to be affected by the injection. Direct influence of the cocaine on the foetus is not to be feared if we bear in mind the slowness with which interchange takes place between the liquid contained in the spine and the rest of the maternal organism.

With doses of one or two centigrammes uterine contraction is energetic and frequent. In some cases, during the first few minutes after the injection, the uterus even retains a certain degree of tension between the contractions. The first time that I used a dose of two centigrammes I felt some anxiety for the foetus, and I believe that with larger doses the risks would increase. It is a question whether doses of three or four centigrammes would not cause tetanus of the uterus.

With the safe dose of one centigramme you can count on from an hour and a half to two hours of comfort. In an hour and a quarter uterine analgesis is complete and the contractions are not felt by the patient. During the next half-hour sensation returns progressively and contractions become perceptible again. If this moment corresponds with the period of expulsion, there is then a vague impulse to bear down. Finally, contractions are accompanied by slight pains, which increase during the last quarter of the second hour. It is, therefore, sooner than this that you must get the confinement over, and you can do this if you do not make your injection until dilatation is well advanced. The best time at which to make it varies, of course, with each case, according to the position of the foetus and according to the probable degree of resistance that the soft tissues are likely to offer.

It is perfectly feasible to make a second injection and thus

prolong the analgesia. The point at which your first injection was made should be used for any that follow, as they will be painless owing to the loss of sensation produced by the first one. I have had occasion to repeat the injection only twice. One case succeeded perfectly (pathological rigidity of the cervix); in the other, which was also an abnormal occurrence (hydrocephalus), the result could not but be appreciated, as labor was prolonged for five hours until forceps was applied.

I am continuing my experiments no longer for the purpose of doing away with the most painful phase of labor, but to make it painless in its entire duration. A method should not be judged by what the patients think of it; and yet, when the point in question is the relief of pain, the patients have a right to express an opinion. Now, all patients who have passed through labor under the influence of cocaine unite in speaking well of the method.

The total number of my cases is not yet large enough to draw definite conclusions from, and it would be rash to attempt to make any comparison between chloroform in obstetrics and the recent cocaine method. Still, we shall not be going too far in saying that, although chloroform has its advantages, such as the ease with which it can be handled and its favorable effect in certain special cases, it has its drawbacks as well,—variable effect when given in small doses, loss of power of retraction of the uterus, risk of uterine inertia, etc.

Cocaine has the following advantages: absolute freedom from pain from the time the lumbar injection is made, increase in the uterine contractions, quicker labor, increase in the power of retraction of the uterus, and great decrease in loss of blood during delivery. On the other hand, you must be in a position to make the injection with absolute asepsis. Owing to the frequency of contraction which occurs in every case, the method appears to be contraindicated when internal version has to be performed.

In the form of analgesia that I have been describing there is a serious lacuna, which is that we only do away with pain from a given moment, though up to the completion of labor, it is true. But to get to this desirable terminus without suffering we are obliged to neglect, or rather to sacrifice, the painful period of dilatation that precedes the point at which we make the injection. We do not attempt to alleviate the suffering of this phase, which

varies considerably in severity. Hitherto we have been satisfied with being of service when labor begins to cause its greatest pain and when the patient grows weary and desperate at the dull torture that she has been subjected to in reaching the stage of moderate dilatation.

Still, the subject is by no means fully elucidated, and the plan of making repeated injections may solve the problem of obtaining painless labor from beginning to end. In any case, with the greater number of multiparæ painless labor can now be practically obtained by the single injection of cocaine in the lumbar region of the spine.

Whether the method will be of use in hemorrhage during labor, in placenta prævia, and in prematurely induced labor, remains for the future to show.

STATISTICS.

Total cases (one case of twins)	25
Primiparæ (one breech presentation)	10
Multiparæ (II.-para to VII.-para)	15
Hydrocephalus fœtus	1
Pathological rigidity of the cervix	1
Placenta prævia	1
Traumatic hæmatoma of the vulva	1
Applications of forceps	4
Perineorrhaphies	2
Curettages	4
Doses used: 7 milligrammes	3
1· centigramme	14
1½ centigrammes	2
2 centigrammes	4
Repeated injections	2
Results: Good,—complete analgesis	21
Incomplete results	4

UTERINE CURETTEMENT AND REPAIR OF LACERATED PELVIC FLOOR: SCIRRHUS OF BREAST: EXCISION OF RECURRENT CARCINOMATA: DILATATION OF CERVIX UTERI; ANCHORING OF KIDNEY; CŒLIOTOMY FOR EXCISION OF CYSTIC OVARY AND TUBE AND VERMIFORM APPENDIX.

BY JOHN B. DEAVER, M.D.,

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UTERINE CURETTEMENT AND REPAIR OF AN INCOMPLETE LACERATION OF THE PELVIC FLOOR.

MRS. H., white, aged twenty-eight, has lately had a miscarriage, and has retained decidua, to remove which it will be necessary to curette the uterine cavity. Vaginal examination shows a bilateral tear of the posterior vaginal wall, involving the levator ani muscles and their enveloping fasciæ. Curettement of these septic cases must be carefully done under proper precaution to prevent the extension of the septic process.

Operation.—Ether anæsthesia, followed by oxygen inhalations. The patient was in the lithotomy position, the thighs and legs being supported on each side by nurses. The anterior lip of the cervix was grasped by a tenaculum after irrigation of the vagina. The cervix was brought down and the canal was dilated by the Goodell-Ellinger instrument. The curette was introduced and carried to the fundus of the uterus, and lightly applied to the mucosa in its descent. The cervical canal was curetted more rapidly and with more force. The uterine cavity was irrigated with hot sterile water, which flowed from an apparatus about four feet above the level of the patient through a long rubber tube and a two-way catheter, the instrument being introduced with the fluid running. When the water returned clear, the cavity was lightly packed with narrow strips of iodoform gauze, one end of which was carried

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to the fundus with dressing-forceps, the other projecting through the cervix to allow free drainage. The upper vagina was lightly packed, preliminary to the second operation. The carunculæ myrtiformes of each side were grasped by forceps and the tip of the crown was raised by a tenaculum. The tissues were put upon the stretch by traction on the instruments. The denudation was outlined by an incision with the scalpel along the outer margins of the sulci from the apex downward and along the base of the laceration. The denudation was made from below upward by a dissection with the scalpel, and was completed upon the inner edges of the sulci. The M-shaped denudation was removed in one piece. Catgut sutures were passed by a straight needle grasped by a hæmostatic forceps, from above downward, from the side of the sulcus obliquely to its base, and were then carried up to the inner edge of the sulcus. Hemorrhage was arrested by the sutures, three on the left side and two on the right, which were tied as they were introduced. Three crown sutures of silkworm gut were passed by a curved needle held in a hæmostatic forceps; they were passed deeply to catch up the muscular fibres, and were not seen in the denudation. Split shot were threaded upon the silkworm-gut crown sutures, the first of which took in the tissues beneath the tip of the crown. Several superficial catgut stitches were passed to approximate the carunculæ myrtiformes and the tip of the crown. The crown sutures were then bound by the shot-compressor. The packing was removed from the upper vagina. The sphincter ani muscle was lightly stretched, to prevent rectal tenesmus. Gauze dressings and a perineal bandage were applied.

The stitches were removed on the tenth day, union being perfect. The patient was discharged on the sixteenth day.

The curette should very gently be carried to the fundus of the uterus and applied lightly in its descent, so that the mucosa only will be wounded. Perforation and traumatism of the uterine wall result in peritonitis and septic phlebitis of the broad ligaments.

Drainage should be free. An excess of gauze will tampon the uterus and obstruct drainage. Tubo-ovarian disease may develop as a sequel.

The *pelvic floor* is a musculo-membranous diaphragm formed by the coccygeus and levator ani muscles of each side, with their investing fasciæ and the subpubic and triangular ligaments. It is

pierced by the openings of the urethra, the vagina, and the rectum. The levator ani muscles with their fasciæ converge to the outlets of the rectum and vagina and blend in the strong rectovaginal septum. To restore the integrity of the pelvic floor the torn ends of these muscles with their fasciæ must be reunited.

SCIRRHOUS CARCINOMA OF THE LEFT BREAST.

M. H., female, white.—The growth is of six months' duration. That a certain percentage of these cases is curable by early radical operation we have no doubt. But with a history of six months' development and with considerable tumor it is questionable whether the most radical measures will eradicate the disease. If by rapid microscopic examination of the lymphatic glands the limits of the extension of the malignant process could be made out, much labor might be saved. By formaldehyde fixation and section of the frozen specimen rapid study is possible. The conditions presented by this case are those of advanced carcinoma. There is complete retraction of the nipple, due to contraction of the lactiferous ducts and of the suspensory ligaments of Sir Astley Cooper, which pass through the glandular structures between the superficial and deep layers of the superficial fascia.

Operation.—Ether anæsthesia, followed by oxygen. The patient was in the horizontal position, the left arm being supported by a nurse. The cutaneous incision was begun at a point about four inches below and to the inner side of the left nipple, and was carried in a gentle curve well below and to the outside of the nipple, to the anterior axillary fold, and then by a sharp rise to the level of the coracoid process. A second incision convex above, internal to and above the nipple, joined the ends of the first incision, and was continued over the shoulder and down the upper anterior fourth of the arm. The skin was reflected from the shoulder and the arm, and the axilla was uncovered. The skin was reflected from the lower incision upon the chest; the lower border of the pectoralis major muscle was exposed; bleeding vessels were covered with the finger and caught with forceps. The skin was reflected upward from the pectoralis major muscle along the inner incision. The axillary vein was exposed in its lower third; the posterior axillary fold was uncovered and the subscapular nerves were demonstrated; the origins of the sternal

fibres of the pectoralis major muscle were divided and the muscle dissected off; a hæmostatic forceps was passed beneath the pectoralis minor muscle and its tendon was cut close to the coracoid process and the muscle cut away. The maxillary glands were then rapidly enucleated by dissection with the scalpel; the lymphatic chain was excised high up beneath the clavicle. The axillary vessels and nerves were completely exposed; the long subscapular nerve was demonstrated. The entire mass was dissected outward to the subscapular vessels and removed. The axillary vessels, the external thoracic, and the long subscapular nerves were demonstrated. The vessels within the forceps were then ligated and the wound was sponged with hot sterile water; oozing points were tied off with catgut until hæmostasis was complete. The skin over the axilla was perforated to receive a drainage-tube, which was carried within the wound to the anterior end of the clavicle; the tube was stitched to the skin at its point of exit. The towel beneath the axilla was removed, and showed that the hemorrhage had been slight. The wound was closed with interrupted sutures of silkworm gut; the lower end being closed first, then the skin of the shoulder and arm, and finally the middle portion. The line of suture was linear upon the chest and shoulder and rounded high upon the shoulder. The sutures were widely placed and there was no tension. The drainage-tube was syringed; the patient was raised and the skin was well dried. Dressings of gauze moistened with a solution of mercuric chloride, abundant dry gauze, and absorbent cotton were applied over the chest and arm and deeply in the axilla. The shoulders were lifted, and a wide roller-bandage was applied over the chest, upper arm, and left shoulder. Pressure upon the sound breast was avoided. Adhesive strips were placed over the bandage.

Examination of the extirpated breast revealed a new growth about the size of a lemon, which infiltrated the organ, and was whitish in color, firm to the touch, and opaque on section—exuding a small quantity of cancer juice. Several axillary lymphatic glands appeared enlarged. Microscopic examination showed the growth to be an adeno-carcinoma of the scirrhous variety with metastasis to the axillary lymph-glands.

The *dissection* of the axillary structures should be made with the scalpel. The advocates of early operation should avoid the

traumatism which results from the use of the blunt dissector. When the axillary vein is infiltrated and adherent the portion affected should be excised after ligation above and below.

Rapid, widespread dissemination may result from ulceration. This is important to bear in mind. Foci of disease are established throughout the system through means of the lymphatic channels.

A successful operation must be bloodless, and the minimum amount of the anæsthetic only should be given. Many hæmostatic forceps are required. Operation otherwise should not be attempted. The largest vessel cut was the long thoracic artery. The bleeding from the perforating branches of the internal mammary and the intercostal arteries is often troublesome. The vessels retract into the intercostal spaces; and it is necessary to catch up the fascia with the bleeding point. Occasionally it is necessary to break through the fascia and secure the vessel. The ligation of vessels and the suturing of the wound occupies the major portion of the time, and is a most important part of the operation. Not much shock follows these operations. If the patient is reduced and not in condition to react well to the operation, some precautions are necessary. In such cases we use saline transfusion.

The *function of the arm* subsequent to the operation is not impaired. The clavicular portion of the pectoralis major muscle and the anterior fibres of the deltoid take the place of the great pectoral. Avoid injury to the posterior thoracic nerve, supplying the serratus magnus, and the long subscapular nerve which innervates to the latissimus dorsi. With these structures intact the patient can soon dress her own hair.

Complete closure of the wound is desirable, yet this cannot always be obtained. It is better to have the wound remain partially open than to have a malignant condition develop in the cutaneous flaps. Too great tension upon the sutures is likewise to be avoided. If the wound cannot be well closed, it should be allowed to granulate, and finally be skin-grafted. Some surgeons apply skin-grafts at once before the patient leaves the table. If the surface to be grafted is large, the area from which the skin flap was removed becomes very painful and is long in healing.

Drainage is very important. The drainage-tube will remain two or three days. If it remained longer, it might become a channel of infection, or in any case it would be a foreign body. Having

served its purpose, it should be removed. The dissection is extensive. In the present exposed wound the hemorrhage is arrested. In the subsequent reaction there will be some blood thrown out. There are dead spaces in the wound in which the fluid might collect; and while perhaps this would remain sterile, it would retard the progress of healing.

The *shape of the skin flap* is so designed that the subsequent scar will interfere as little as possible with the normal structures. Dense scar tissue within the axilla may greatly restrict the motion of the arm. Œdema of the arm or neuritis sometimes persists.

Massage and early passive motion may prevent these complications. This is an important point upon which text-books lay no stress. Formerly the patients remained in bed for a week or two. We have ours out of bed after two days.

Do not bandage too tightly. The uncomfortable pressure of the bandage upon the sound breast has too often been regarded as a cause of subsequent pathological conditions. Try to send the patient back as comfortable after as before the operation. Study the comfort of the patient.

The *subsequent condition* of the patient will be carefully watched. The pulse is now 90. Secondary shock may develop when there has been no indication of primary shock.

The subclavian triangle is opened and the glands of the neck are removed in a certain percentage of cases. We excised the lymphatic chain as high as possible beneath the clavicle, and examination of the specimen indicates undoubted infiltration in this situation. A recurrence is indicated if life is sufficiently prolonged. Accordingly, we have done all that a radical operation calls for in this particular case.

The operation should be performed by the surgeon only. As done ordinarily, by one not practised in the methods, it had better not be done at all.

EXCISION OF RECURRENT CARCINOMATA IN THE CICATRICES OF DOUBLE BREAST AMPUTATIONS.

L. C., female, white, aged forty-nine years.—Seven years ago the patient's right breast was removed. One year ago the left breast was removed here for a malignant growth. There is now well-marked recurrence in the wound of the first operation; and

the cicatrix of the left side is in one spot suspiciously adherent, indurated, and slightly discolored. The family history is most remarkable. Seven of a family have died of malignant disease. This patient is the only one who would submit to operation. In the presence of this unique family history and in a patient as well nourished as this one, it is possible that there may be several local recurrences, and yet the patient may enjoy long life.

Local recurrence is, however, a most discouraging condition to both patient and surgeon. Hence, in attacking the primary disease, cut clear of the morbid tissues and remove invariably the associated lymph system. Remove the submaxillary lymph glands before attacking an epithelioma of the lip; and remove the glands of the groins before operating upon a malignant condition of the genitalia. This is the only correct method of procedure, and is equally applicable to malignant disease of the uterus. Anxiety to secure a skin flap large enough to close the wound is often the explanation of a local recurrence. All the suspicious skin should be removed even if a large granulating wound remain. Subsequent skin-grafting will hasten the healing process, only greater limitation of motion will result.

Operation.—Ether anæsthesia, followed by oxygen. The patient was in the horizontal position. The right scar was irregular and adherent at its middle, a knob-like projection from its upper border constituting the focus of disease. It was slightly purple in color and adherent below. An incision, convex downward, was made beneath the growth from a point internal to the scar to the anterior axillary fold. The skin was reflected, and a similar incision, convex upward, was made above. The vessels were caught. The skin was reflected, and the mass was dissected free from the chest wall in a direction from within outward. It was decided not to trespass upon the structures of the axilla for fear of contaminating fresh avenues. The wound was sponged and the vessels included in the forceps were tied. The scar upon the left side was irregular, indurated, and discolored along its lower margin high in the anterior axillary fold. Incision was made about one inch from the border of the scar above and below, the lower incision curving well beneath the infiltrated area. The skin was reflected, the vessels were caught, and the mass was dissected from the chest wall. By dissection with forceps and scissors indurated masses

were removed from the axilla. The wound was sponged and the vessels tied. The skin over the axilla was pierced, and a drainage-tube was fixed at this point by a stitch. The wound was closed with interrupted sutures of silkworm gut. The right wound was treated in like manner. Dressings of gauze moistened in a solution of mercuric chloride, dry gauze, and absorbent cotton were applied and fixed by a wide roller·bandage, which included the thorax, the shoulder, and the upper arm of each side.

The stitches were removed on the fourth day, on account of cutting. The wounds granulated. rapidly. The patient being discharged on the twenty-fourth day.

The *swelling and œdema of the arm* for which patients consult the surgeon subsequent to breast operation are of two forms. The œdema coming on three or four weeks after operation is due to lack of adequate support of the vessels. The normal muscular and connective-tissue support being removed, the axillary vein tends to fall internally upon the chest wall. Treatment by a bandage, massage, and manipulation usually suffices to relieve this symptom. Early passive motion, and after the tenth day, when healing is established, more active massage, and finally, after the second week, exercise of sweeping, all tend to restore the function of the part. The second form of œdema is due to pressure upon the axillary vein from infiltrated glands and connective tissue. It is a most serious condition, and can often be relieved only by the removal of the vein. Amputation at the shoulder has been suggested on account of the weight of the œdematous extremity.

DILATATION OF THE CERVIX UTERI; ANCHORING OF THE RIGHT
KIDNEY; CŒLIOTOMY FOR THE EXCISION OF A CYSTIC
LEFT OVARY AND TUBE AND THE VERMIFORM
APPENDIX.

L. V. C., female, white, aged thirty-one years.—Patient was admitted to the hospital with a history of having begun menstruating at sixteen years of age. There was always dysmenorrhœa, with fainting spells during the first two years of menstruation. There has been no leucorrhœa. During the last ten years she has been troubled with indigestion, flatulence, and severe headaches, all of which have grown worse in the last year. Examination revealed a markedly retroflexed uterus and a movable kidney.

The symptoms of movable kidney are variable. Only slight

pain and uneasiness may be felt. Occurring in the neurotic and neurasthenic, its subjective manifestations are more or less exaggerated. Mucous diarrhœa in a neurasthenic always indicates an examination for movable kidney. Operation in this class of cases should be advised only after carefully studying the patient and weighing the symptoms. On the other hand, acute agonizing pain followed by vomiting may suggest appendicitis or closely simulate stone in the kidney or nephritic colic. In certain cases it is difficult to make a differential diagnosis between floating kidney and chronic appendicitis, and in some it is almost impossible without examination under anæsthesia.

A young lady lately in the hospital presented all the symptoms of a renal calculus; the x-ray examination, however, was negative. There was paroxysmal pain radiating to the left loin, and the urine passed after the attack was bloody, a most significant sign. Examination for movable kidney was negative, but as the patient was strong and muscular palpation was uncertain. In consideration of the negative result of the x-ray examination, an operation for a movable kidney was performed. Incision was made in the left loin. The kidney was movable. There was a small hydronephrosis of the pelvis and ureter, resulting from a twist in the ureter. This was drained. The excess of the ureteral pelvis was cut away and the pelvis closed by Lembert sutures. Iodoform gauze packing was placed about the line of suture. The kidney was anchored.

In a parallel case appendicitis, pelvic disease, and right-sided kidney affections were suggested by the consultants. On examination the appendix was found to be normal; the pelvic structures were likewise normal. Pressure high in the loin elicited tenderness. In view of the symptoms of violent acute pain, followed by bloody urine and symptoms of vesical irritation, it was decided that the principal trouble was with the kidney.

The physical examination for movable kidney should be made with the patient lying on the side opposite the affected side, with the thighs flexed on the abdomen and the legs flexed on the thighs. The patient is instructed to breathe deeply; the kidney is thus forced down by the descending diaphragm and tends to fall to the opposite side. It may be recognized as it descends, and may be outlined by gentle pressure deep in the loin. Too strong pressure may be responsible for failure to detect the condition.

The uterus is retroflexed, its fundus occupies the hollow of the sacrum. There is mechanical dysmenorrhœa. For the relief of this condition there is a choice of many operations: shortening of the round ligaments within the inguinal canal or in the abdominal cavity, ventral fixation and suspension, and vaginal suspension. The old and simple operation to be performed in this case promises good results in carefully selected cases. It is a minor gynæcological operation, but should be done with strict antiseptic precautions. Gentle and gradual dilatation of the cervix, manual replacement of the organ, and rest in bed may suffice to correct the condition. During the period of convalescence from the operation the relaxed ligaments may recover themselves.

A vaginal examination will be made at the end of one week, when, if the retroflexed uterus has relapsed, a pessary will be introduced to maintain the organ in the correct position.

Operation (dilatation of the cervix).—Ether anæsthesia. The patient was in the lithotomy position, the thighs being supported on each side by a nurse. The cervix was dilated, and the uterus replaced in its normal position in the usual manner. A vaginal examination was made; the sound was made almost straight, and was introduced to demonstrate the degree to which reposition had been accomplished. Vaginal reposition with the sound *in situ* demonstrated a pathological condition, unrecognized before,—*i.e.,* a left cystic ovary, which was prolapsed into the posterior cul-de-sac. The vagina was irrigated.

The skin of the abdomen was disinfected preparatory to an abdominal section for the removal of the left cystic ovary and the vermiform appendix, the patient having had an attack of appendicitis previously. A wide zone of the abdomen was washed with green soap and water and a solution of turpentine; this was followed by alcohol and sterile water, solutions of potassium permanganate, oxalic acid, and mercuric chloride. Sterile dressings were bound over the disinfected area.

The abdominal operation will be done last.

The *incision for nephropexy* should be longitudinal and about three-quarters of an inch beyond the erector spinæ mass, in order to reach beyond the outer border of the quadratus lumborum muscle.

The *lumbar fascia* embraces this muscle by its anterior and middle lamellæ. The anterior layer of the lumbar fascia springs

from the front of the tips of the transverse processes of the lumbar vertebræ, forming the anterior sheath of the quadratus lumborum muscle, a thickening of this layer extending from the first and second lumbar vertebræ to the last rib,—the external arcuate ligament. The strong middle lamella sheaths the quadratus lumborum muscle and, blending with the anterior layer at its anterior border, gives attachment to the fibres of the transversalis and the internal oblique muscles. The posterior layer encloses the erector spinæ mass posteriorly, is attached to the vertebral spines, and gives origin to the latissimus dorsi and serratus posticus muscles. Hence the incision goes through the skin, fasciæ, fibrous attachments of the latissimus dorsi muscle, the fibrous attachments of the internal oblique and transversalis muscles, and the fascia transversalis. The kidney fat is then exposed.

The *perirenal fat* is in two layers, the second layer forming a transparent fascial envelope, which is often mistaken for the true capsule of the kidney. Especially is this so in a movable kidney, when from the irritation consequent on motion it becomes thickened and adherent.

Suture fixation of a movable kidney is dangerous. One of the hospital cases resulted in a pyonephrosis which ruptured into the ureter and became evacuated six weeks after operation. The case was clean and the surgery clean, the wound showing primary healing. The condition could be explained only by extravasation of urine into the connective tissue of the kidney consequent upon puncture of the uriniferous tubes by the suture needle. Christopher Heath has also had two such cases. Suture of the capsule only affords no adequate fixation. By a dissecting-room experiment you can become convinced of the ease with which such sutures cut through. The inflammatory adhesions consequent on the manipulation and operative procedure are the real bond of fixation. Hence the operation devised by Senn, consisting in the removal of the kidney fat, the scarification of the capsule with a needle, and anchorage of the kidney by iodoform gauze packing is the most certain cure.

The operation which will be done differs from Senn's only in scarification with the knife in preference to the needle, and in the repacking of the wound with gauze after removing the primary packing.

In separating the fat from the kidney, it should be torn through at the outer convex border of the organ, and separated by the finger and the scissors. The anterior surface is in close relation to the peritoneum, and should be bared carefully.

Operation for Anchoring the Right Kidney.—The patient lay upon the left side, a firm sand-pillow being placed beneath the left loin and the thighs being slightly flexed. With a compress formed from a towel pressure was exerted over the right lumbar region. A longitudinal incision was made in the right loin midway between the last rib and the crest of the right ilium and about three-quarters of an inch external to the erector spinæ mass. The incision was deep, the perirenal fat protruding through the wound. The fat was grasped with forceps. The finger was passed through the wound and the fat was torn loose, anterior pressure being made over the loin by the left hand. The wound was enlarged above and the kidney was delivered. The organ was covered with hot moist gauze. With tissue-forceps and scissors the second layer of the perirenal fat was dissected from both surfaces and from the borders of the organ. The peritoneum and the portion of the duodenum in relation with the anterior surface of the kidney were seen in the wound. The right ureter and its pelvis were examined and demonstrated. The surface of the kidney was scarified by the knife, especially along the convex outer border and the upper and lower extremities. Small remnants of the second layer of fatty capsule were removed. Free oozing from the scarified surface was noticed. The outer edge of the wound was retracted. Long strips of iodoform gauze were passed horizontally beneath the upper and lower poles of the kidney, and the ends were brought out beyond the margins of the wound. Iodoform gauze was freely packed within the margins of the wound, the organ having been reposited. Two loose pieces were placed over the wound externally, traction on the horizontally placed gauze straps controlling the position of the organ. These straps were tied together over the mass of the gauze. Dressings of dry gauze were applied.

The *iodoform gauze* will excite an active inflammation in the area which it encloses, and thus will form a bed of granulation-tissue in which the kidney will become permanently anchored. It will be removed in from seven to ten days, depending on the local conditions. A case now in the hospital has remained packed

for twelve days. The wound will be repacked two or three times, but not to the same degree.

Abdominal Section.—The patient was in the Trendelenburg position. Incision was made within the right rectus muscle midway between the umbilicus and the pubes and the abdomen opened in the usual manner. The left ovary and tube were markedly cystic; the structures on the right side were normal. The ovary and appendix were removed in the usual manner. The wound was closed without drainage by the tier method, and was dressed in the usual manner.

The *appendix* should always be removed when the abdomen is opened for a condition so trifling as in this case, especially if the patient has suffered from appendicitis, as had this one.

The abdominal wound healed by first intention; the stitches being removed on the eighth day. The gauze packing in the nephropexy was removed on the tenth day, the granulations being all that could be desired. The patient was discharged on the forty-third day, with a small granulating wound in the loin.

VAGINAL OVARIOTOMY.

BY J. A. C. KYNOCH, M.B., F.R.C.P. (Edin.),

Professor of Midwifery in St. Andrew's University; Gynæcologist to the Hospital.

GENTLEMEN,—A few weeks ago you saw me remove a large ovarian tumor through an incision in the posterior vaginal fornix, and this week you have seen two abdominal sections, the one performed for hydrosalpinx and the other for a multilocular cyst. I propose to-day to compare these two methods of removing pelvic tumors and to refer more especially to the operation of vaginal ovariotomy.

The vaginal operation is not a new one; thirty years ago Thomas removed an ovarian tumor by this method, and about the same time other American gynæcologists—as, for example, Batty and Goodell —reported favorably on the operation. Ten years later it fell into disuse, owing to the excellent results obtained by abdominal section, which was at that time universally adopted. Within the last year or two, however, and chiefly on account of the successes obtained by Dührssen, of Berlin, the vaginal operation has, both in this country and abroad, found many supporters. Schauta, of Vienna, has quite recently expressed himself in its favor, his ratio of mortality being 1.94 as compared with 9.5 per cent. for the abdominal operation. It must, however, be noted that of the latter several were begun as vaginal ovariotomies, but it was found necessary to complete them by the abdominal route.

The vaginal operation may be undertaken for the removal of small or large ovarian tumors which lie low in the pelvis and the lower border of which can be felt through the vaginal fornix.

I shall read to you short notes of four cases which have been recently treated here, illustrating both classes of tumors:

1. Mrs. B., twenty-seven years of age, complained of bearing-

down pains for the past three years; menstruation began at nineteen, and was always regular but associated with a good deal of pain; no full-time pregnancies; three miscarriages at the second, third, and fifth months. On examination there was felt through the posterior fornix a movable tumor the size of an orange and separate from the uterus. The right ovary appeared to be normal, the left one could not be felt. The case was diagnosed as a left-sided ovarian cyst. The tumor, which proved to be a dermoid of the left ovary, was easily removed through a posterior vaginal incision.

2. Mrs. M., eighteen years of age, complained of pain in the left iliac region, of five months' duration, aggravated by menstruation, which had always been regular. She had never been pregnant. On vaginal examination the uterus was felt anteverted and movable, and behind and separate from it there was found a swelling about the size of a turkey's egg. On removing the tumor through a posterior vaginal incision, it was found to be a left-sided papillomatous ovarian cyst.

3. Mrs. D., forty years of age, was admitted on account of retention of urine. During the past two years she had had three similar attacks. Previous to her admission sixty-eight ounces of urine had been drawn off. Menstruation regular; she has had seven normal confinements. On examination, the cervix was reached with difficulty: it was high up and behind the symphysis. Through the posterior fornix a cystic swelling was felt, the upper border of which reached to two fingers'-breadth below the umbilicus. The tumor —a papillomatous ovarian cyst the size of a melon—was easily removed through the posterior fornix.

4. Mrs. R., thirty-four years of age, complained of pain in the right iliac region of six weeks' duration. Abdominal section had been performed by me eighteen months ago for a left-sided papillomatous ovarian tumor the size of a foot-ball, complicating pregnancy at the fourth month. Her pregnancy, however, went on to full time and terminated favorably, and she remained well till her present complaint began six weeks ago. On examination, a cystic swelling was discovered in the right fornix the size of a fetal head, pushing the uterus forward and to the left side. With our previous knowledge of the removal of a left-sided ovarian cyst, this was regarded as a rapidly growing tumor of the other

ovary. It was easily removed through the posterior fornix and proved to be a multilocular cyst.

All these patients made uneventful recoveries and were discharged from the hospital on the fourteenth day.

The preparation of the patients for operation was exactly the same as that adopted in the two cases of abdominal section now in this ward, with the addition that for three days previous to operation the vagina was rendered as aseptic as possible by thorough swabbing and douching with one per cent. lysol solution. The patient being placed in the dorsal position with the hips elevated, the cervix is pulled forward and with a Simon's speculum the posterior vaginal wall is drawn well backward. As with abdominal section, the operation of vaginal ovariotomy may be described as having three stages: first, opening into the abdomen; second, examination and removal of the tumor; third, partial or complete closing of the vaginal wound. The peritoneal cavity may be opened into either through an incision in the anterior or posterior fornix. The former is the first stage in vaginal hysterectomy, and although of service in the removal or inspection of small tubal swellings, is not so suitable for removing ovarian cysts of any size as the posterior incision. With scissors and dissecting forceps a transverse incision about one inch long is made through the vaginal mucous membrane behind the cervix, the connective tissues snipped through, and the peritoneum opened either with scissors or by puncturing it with sinus forceps and enlarging the wound to the desired extent. The edges of the wound, including the peritoneum, being held asunder by pressure forceps, the cyst may be inspected, the presence or absence of adhesions ascertained, and the tumor tapped and pulled down through the incision, allowing the pedicle to be ligatured in the usual way. The wound may be completely closed by silkworm-gut sutures which are removed on the eighth day, the closure being partial in exceptional cases only, where drainage is thought necessary. These patients receive practically ordinary diet from the day of operation.

The chief objection to the vaginal as compared with the abdominal operation is the limited space one has to work in, which renders it difficult to see the parts handled and to manage adhesions, and while operating on this patient by abdominal section for left-sided hydrosalpinx I had, on account of adhesions, to depend en-

tirely on the sense of touch when bringing the tumor up to the abdominal wound. The patient's complaint of pelvic pain, dating from what appeared to be a severe attack of pelvic peritonitis, suggested the probability of adhesions, and for this reason the abdominal route was chosen. The other patient now in the ward had a ventral hernia following upon ovariotomy performed two years ago. As the hernia could be treated at the same time as the removal of the recurrent ovarian cyst, the choice of repeating abdominal section was justified. In the fourth case, the first ovarian cyst was removed by abdominal section on account of its position high in the abdomen, whilst the cyst subsequently developing in the other ovary being felt low in the pelvis, was best treated by vaginal ovariotomy. If, after beginning the vaginal operation, it is found that adhesions prevent the tumor being drawn down sufficiently for ligature of the pedicle, the operation may be completed by the abdominal route without additional risk, for such patients are always prepared for the contingency of abdominal section being necessary. The advantages of vaginal as contrasted with abdominal ovariotomy are: first, a shorter convalescence,—an important element in the case of hospital patients; second, less shock on account of the peritoneum being not so much exposed; third, no abdominal cicatrix and therefore no risk of subsequent hernia.

One of the above recorded cases had a normal labor eighteen months after operation, and the only trace of the previous ovariotomy was a white linear cicatrix in the upper part of the posterior vaginal wall.

It would be well before deciding upon the line of treatment to be adopted for pelvic tumors to ask ourselves the question, " Can this tumor be removed through the vagina ?" If there is no inflammatory history, and if the growth is movable and low in the pelvis, its removal through the vagina will be found the easier and more satisfactory method.

Diseases of the Eye

POINTS IN THE DIAGNOSIS OF IRITIS AND GLAUCOMA.

ADDRESS BEFORE THE DENVER AND ARAPAHOE COUNTY MEDICAL SOCIETY.

BY EDWARD JACKSON, A.M., M.D.,

Emeritus Professor of Diseases of the Eye in the Philadelphia Polyclinic;
Ophthalmologist to the Arapahoe County Hospital,
Denver, Colorado.

GENTLEMEN,—It is of practical importance to every practitioner of medicine to distinguish from the less serious ocular inflammations iritis, that will entail several weeks of ocular disability and demands the prompt use of a mydriatic, and glaucoma, which may cause blindness in spite of any treatment and in which the use of a mydriatic might be disastrous.

Redness.—The distinction can often be made by close attention to the character of the redness. The redness of conjunctivitis resembles that of the normal conjunctiva in being deepest at the retrotarsal fold and fading out towards the corneal margin (see Fig. 1). This is the case even when only a part of the conjunctiva is involved, as in phlyctenular or traumatic conjunctivitis.

The redness associated with iritis is the pink pericorneal zone. It depends upon vessels too fine to be seen separately and does not extend back to the retrotarsal fold. (See Fig. 2.) But this redness also accompanies keratitis and inflammatory glaucoma. The redness peculiar to chronic glaucoma, however, is of a different character. It is based on the large, perforating veins, four or five of which may be recognized in most normal eyes. These emerge from the sclera of full size, usually several millimetres back from the corneal margin, but sometimes from the ciliary region. (See

Fig. 3.) In chronic glaucoma they become greatly enlarged, and are connected one with another by a net-work of vessels not seen in the normal eye, which taken together form around the cornea a ring of comparatively large vessels, very different in appearance from the pericorneal zone.

But we must remember that the redness typical of the particular disease is not always distinguishable. The pericorneal zone may underlie and render less noticeable the vascularity of glaucoma, as in Fig. 4, or swelling and redness of the conjunctiva may conceal all beneath, especially in the earlier stages of an acute iritis or when the eye has been poulticed for some time with domestic remedies.

Pain.—The pain which attends iritis or glaucoma is usually the symptom to which the patient attaches greatest importance; we commonly think of it as severe, and it may be extremely so. In iritis it may for many days and nights prevent sleep, in spite of anodynes. In glaucoma it may be as severe as any that patients ever suffer. I recall a case of secondary glaucoma, from traumatic luxation of the lens, in which the patient lost over fifty pounds, one-third of her weight, in a few weeks, simply through the terrible suffering from this cause. The demonstration was completed by her regaining fifty-six pounds in weight within two months after the enucleation of the injured eye.

But we must remember that either iritis or glaucoma may exist without pain. There is a special form of iritis that is quite free from pain. Grandclement has named it " uveitis," believing that it affects only the posterior layer of the iris. I have seen a case of this kind, in which the iris was so universally bound down to the lens that in order to do an iridectomy I had to extract the lens. This patient had undoubtedly suffered many attacks of inflammation, marked by very slight redness and progressive impairment of vision; yet she had never suffered any pain in the eye. In glaucoma too, especially in simple glaucoma running a chronic course, the case may reach the stage of absolute blindness and continued high tension without giving any special history of pain, and I have met patients in this stage who upon close questioning denied they had suffered any pain whatever.

Size of the Pupil.—The size of the pupil is a very important aid in discriminating between iritis and glaucoma. In iritis it is usually contracted and in glaucoma dilated. But one may meet

Fig. 1.—Hyperæmia of acute conjunctivitis.

Fig. 2.—Pericorneal redness of acute iritis.

Fig. 3.—Enlarged veins of glaucoma.

Fig. 4.—Mixed redness of a glaucomatous exacerbation.

with a doubtful case in which a mydriatic has been used, and the pupil is found dilated, although the case is one of iritis. Besides iritis there are other things that cause marked contraction of the pupil. An injury to the cornea, especially an abrasion, or a foreign body retained until some irritation has been set up, is attended with marked contraction of the pupil. The senile pupil is normally so small that iritis produces no perceptible change in it. Then, too, in glaucoma the pupil may not be dilated. In a case of simple glaucoma it may be quite as small as, or even smaller than, is usual among healthy persons of the same age. We must be on guard, too, against those cases which, having been originally iritis, have become secondary glaucoma. Here the pupil may be contracted and adherent, yet for all practical purposes of prognosis and treatment the case is one of glaucoma.

Appearance of the Iris.—Discoloration of the iris is common to both iritis and glaucoma, for in many cases of the latter the iris is actually inflamed. This discoloration consists chiefly in an addition to the normal iris color, of the redness of hyperæmia. Practically the same discoloration is produced when the extra blood-pigment is not in the iris, but is held suspended in the aqueous humor or cornea in front of the iris. Thus, hemorrhage into the anterior chamber, or even behind the lens, with the coloring-matter making its way forward, or hemorrhage under the conjunctiva, with the blood-pigment carried into the cornea with the nutritive fluid, may cause an apparent discoloration of the iris similar to that of iritis.

Depth of the Anterior Chamber.—The apparent depth of the iris may suggest glaucoma, since in many cases of that disease the anterior chamber is extremely shallow. But there are other cases, especially of simple glaucoma, in which the depth of the anterior chamber remains as great as it commonly is in healthy eyes of the same age.

Exudation.—In iritis we expect to find exudate at the margin of the pupil, causing posterior synechia, or within the pupil upon the surface of the lens. Its entire absence might incline one to think that the disease was not iritis but cyclitis, or some other inflammation. It should be borne in mind, however, that inflammation of the iris sometimes continues several days before exudation upon the lens-capsule can be discovered. This I have especially noted in cases of syphilitic iritis. Sometimes many

days passed before any adhesions formed, yet later the exudate was quite abundant. Even though considerable exudate be present, it is often difficult or impossible to see it until the pupil has been dilated by feeble illumination or the use of a mydriatic.

Tension of the Eyeball.—Increased tension of the eyeball is the idea most closely associated with the word glaucoma. Probably the best short definition of the term is " increased tension plus the causes and effects of that increase," and whenever we can certainly recognize an increase in the intra-ocular pressure a diagnosis of glaucoma is justifiable. But it must be remembered that in perfectly typical cases of glaucoma there may occur considerable periods when the tension of the eyeball is really not at all increased. In some cases that present the other features of simple glaucoma no increase of tension is detected at any time, although they go on to absolute blindness with typical cupping of the optic disk. Again, slight changes in the tension of the eyeball are difficult to recognize with certainty, especially if both of the patient's eyes are affected. We have no exact clinical method for measuring the intra-ocular pressure, and comparison by palpation of the eyes of another person can never give very exact information. If two or three experienced ophthalmologists examine a case of doubtful increase of tension, they are pretty certain to arrive at different conclusions. Hence, in the diagnosis of a good many cases of glaucoma, at least when the case is first seen, the state of intra-ocular tension may afford little or no assistance. It illustrates the general truth that it is never safe to base a diagnosis upon a single symptom, no matter how important that symptom may be.

Changes of intra-ocular tension are often mentioned in connection with iritis, but they have no practical importance in its diagnosis. Diminished tension attends a process that involves the ciliary body and usually the whole uveal tract. Increased tension occurs when the results of iritis interfere with the escape of intra-ocular fluid, leading to secondary glaucoma. In such cases the diminution and increase of tension may be very great, but in simple iritis they are always comparatively insignificant, and often exist only in the fancy of the physician. They offer no reliable assistance towards a diagnosis.

Ophthalmoscopic Symptoms.—These may be quite sufficient to justify a diagnosis of glaucoma. The glaucomatous cupping of

the optic disk, pulsation of the retinal arteries, and halo atrophy of the chorioid are found combined in no other condition. But cupping of the optic disk is rather a late symptom. It requires several weeks or months to become certainly recognizable. In the earlier exacerbations, even though these may cause complete blindness, cupping of the disk is not present. In simple glaucoma the cup indicates that the case is already chronic. Pulsation of the retinal arteries, too, is often absent and at other times very difficult to recognize with certainty. Then by a little pressure on the eyeball, as in testing its tension, the pulsation may be stopped and not reappear again for many minutes. The halo atrophy of the chorioid is sometimes quite absent throughout the case, and generally appears rather late.

In iritis the ophthalmoscope may reveal the points of deposit upon the posterior surface of the cornea or the anterior surface of the lens, or the existence of vitreous opacities or areas of chorioidal disease. These points may be needed to complete a diagnosis of the case; but they are not such as usually settle the question, Is the case one of iritis or not?

Field of Vision.—In uncomplicated iritis this is not effected. Yet vitreous opacities may interfere with the usual methods of mapping the field, so as to give the impression that it is decidedly contracted. Accompanying chorioidal lesions may cause scotoma, and serious cyclitis may lead to real contraction of the field.

In glaucoma some impairment of the field always occurs. It is likely to be one of the earliest of the constant symptoms. The nature of this impairment is sometimes spoken of as characteristic, but this is not the case. Narrowing of the nasal field is generally mentioned as indicating glaucoma. It is encountered in many cases, but not in all, or nearly all. Scotomas and all sorts of irregular contractions are also encountered. G. E. de Schweinitz has shown that the average of large numbers of glaucomatous fields approaches a concentric contraction, the loss of field being but slightly greater on the nasal side.

I have seen a too great reliance upon impairment of the field of vision lead to the suspicion of glaucoma in a case of acromegaly. The patient had a very remarkable, irregular defect in one field, with pain in and about the eyes, which led the surgeon to consider the question of iridectomy. Comparison of the patient's face and

physique with that of her brother and with her own previous appearance, however, rendered the diagnosis perfectly clear.

Other Symptoms.—Impairment of central vision, although it usually attends both iritis and glaucoma, is not constant, and is never characteristic of either disease.

Evidences of general disease may be suggestive, but can be nothing more. Of cases of syphilis, the most common cause of iritis, not more than one in thirty ever have inflammation of the iris. Among cases of rheumatism it is even less frequent. The uric acid diathesis, which is supposed to be associated most closely with glaucoma, is such an indefinite thing, and may so often be made out in cases that have no glaucoma, that it has no diagnostic value.

Impairment of corneal sensibility is usually present in glaucoma, after more characteristic symptoms have developed; but it may be present in trifacial neuralgia or neuroparalytic keratitis, conditions quite apt to be confounded with glaucoma. The symptom of a distinct halo around each light at night is very suggestive of glaucoma. But it has been noticed in eyes quite free from glaucoma, while in many cases of this disease it never attracts attention.

The age of the patient cannot throw much light on the case. Iritis occurs at all times of life; and glaucoma, although most common between sixty and seventy, may occur in childhood.

The Use of a Mydriatic.—The use of one of the briefer mydriatics is a diagnostic resource that deserves attention. In the *American Journal of the Medical Sciences* for April, 1898, I advised the use of homatropine, in certain doubtful cases, as a test for the existence of glaucoma. While my paper was in the printer's hands, the same suggestion was made by Dr. G. C. Harlan, before the section of ophthalmology of the College of Physicians of Philadelphia. But the conditions that I annexed to the suggestion in my paper should be carefully borne in mind. The probable effect of the test should be previously fully explained to the patient, and his assent obtained to the prompt performance of an iridectomy in case glaucoma should be revealed. It is a suggestion that has practical value chiefly in cases where the diagnosis is necessarily doubtful and the patient is unable to remain within reach of a competent adviser.

In the diagnosis of doubtful cases of iritis, homatropine and still more euphthalmine and cocaine are of especial value. A drop of a solution of one of these in the eye will cause a free dilatation of the normal pupil, or reveal the imperfect dilatability of the pupil in the presence of iritis. But in the former case the recovery from the drug would be so prompt as to entail very little inconvenience, while in the latter the necessity for a stronger mydriatic would be rendered unmistakable.

Course of the Disease.—When one can obtain a complete and intelligent history of the case, the recognition of iritis or glaucoma becomes comparatively easy. In iritis the pain continues gradually to increase, with the increase of other symptoms of inflammation, for several days, and the attack lasts for weeks,—usually from three to eight weeks. Repeated attacks may occur, but they are each of this character and are separated by considerable intervals.

In glaucoma dimness of vision and pain come on together, reach their height in a few hours, and may subside entirely after sleep; or they may continue through many days, but with marked remissions. When the pain is continued many hours or days, the redness comes on. Of these attacks there are generally many. The improvement of all symptoms during the interval leads to deceptive hopes of a permanent arrest of the disease; but in the end, while most cases of iritis come to recovery more or less complete, all cases of glaucoma, unless effectually treated, go on to complete and permanent blindness. The possibility of the presence of glaucoma should be borne in mind in connection with every case that appears to be one of conjunctivitis, keratitis, facial erysipelas, cataract, optic atrophy, facial neuralgia, and rheumatism, or la grippe with ocular symptoms.

Laboratory Methods

SOME PRACTICAL METHODS IN PHOTO-MICROGRAPHY.

BY W. H. WALMSLEY,

Fellow of the Royal Microscopical Society.

I HAVE been asked to write for the pages of the INTERNATIONAL CLINICS an article which shall comprise, within a limited space, the essence of photomicrography, be simple, so that he who reads may derive sufficient acquaintance with its practical side and application, to enable him to do acceptable work without further instruction other than that gained from his own efforts, and finally to teach him how to utilize any microscopic and photographic appliances that may be available, without regard to their original design or form. Now, this is a pretty hard task with a subject so great and far-reaching, that the limits of a large volume would scarce suffice to do it justice. None the less, the attempt will be made, with what success my readers must determine for themselves.

The distinction between photomicrography and microphotography has long been recognized, and is thus defined in the latest dictionaries: " *Photomicrograph,* an enlarged photograph of a microscopic object, produced by throwing its image through a suitable combination of microscope and camera." " *Microphotograph,* a minute photograph of any subject, so small that its form or details are invisible to the unaided eye, requiring the use of a microscope to see them." It is with the former of these—photomicrographs—that we have to do.

With the exception of Surgeon-General Sternberg's treatise, now rather old, all the books on the subject are by foreign writers, and almost without exception take the ground that good work in photomicrography cannot be done without the aid of the very best

and most costly apparatus. Now, there is no doubt that this cannot be too perfect,—none of man's productions are; but, if it were true that good and reliable photographs of microscopic objects cannot be made with appliances that every student uses in his daily work, the extended application of photography to reproducing its results would be quite impossible. It will be the purpose of this paper to show that it can be done very correctly with the simplest appliances, and to point out the methods of so doing in such a manner as can be easily comprehended and followed to success by any one willing to give due time and patient work to them.

About the simplest and lowest-priced instruments furnished for class work in our schools are those of which the " Star" microscope of Beck's may be taken as a sample. The stand is simplicity itself, with large stage and removable spring clips, jointed double mirror, inclination to body, coarse adjustment by rack and pinion, and quite delicate fine adjustment by micrometer-screw. There are a draw-tube to compound body, a double nose-piece, one Huygenian eye-piece, and two objectives, a two-thirds and a one-sixth, the former being only a single achromatic combination. A simple form of iris diaphragm is fitted to the stand. There is no substage con-denser, though one is supplied, I believe, at a small additional cost. The price of the whole outfit as described is only a little over thirty dollars. There are absolutely none of the delicate appliances which the books tell us are indispensable, yet photographs covering a considerable range of subjects as well as amplification, may be made with the simple apparatus as described.

With this glance only, at the very cheapest form of microscopical apparatus that has any recognized value, we pass to the usual " student's" microscopes and accessories in general use by our col-leges and higher institutions of learning, as well as by medical and other professional men in their daily work. Of these instruments well-prepared stands and objectives are now made in this country by several optical firms, while of those abroad Beck, of London, and Zeiss and Leitz, of Germany, are the most familiar examples. These are all of somewhat similar grade and model; the stands being of the so-called " Continental" form, with " horseshoe" base, inclination to body, large stage with clips, double mirror, Abbé condenser and iris diaphragm, telescope body, rack-and-pinion coarse adjustment, micrometer fine adjustment, one ocular, and two

objectives, two-thirds and one-sixth. They are all very similar in size, form, accessories, and cost, with a striking equality in the optical capacity of objectives. Having had an opportunity to test all of them thoroughly within the past year, I am enabled to speak from the stand-point of experience, photographically. A homogeneous immersion one-twelfth, of exceedingly good quality and very low price, is to be had from many of these makers; it is admirably adapted to bacterial work, or any other requiring so great amplification as this lens is intended to give. A bull's-eye condensing lens, mounted on portable stand with universal movements, should be added to the outfit for photographic purposes, though not usually supplied with the microscope for class work. With such an instrument and accessories, very good advanced work in photomicrography, including bacterial subjects, may be done with careful and painstaking manipulation.

A camera specially designed for photomicrography should be employed if procurable. If this is not the case, one of any size or design may be used, provided it is fitted with a ground-glass focussing-screen. This is an indispensable feature. None of the closed-box forms with a lens of fixed focus, is adapted to the purpose. The magnified image of the object must be seen and focussed upon the screen, which must be replaced by the plate-holder in making the exposure. If the camera be of a larger size than necessary, inside kits or carriers may be fitted to the plate-holders, which will carry any smaller sizes of plates decided upon; these should be no larger than are requisite for the proper amplification of the specimen, both on the score of economy and for greater ease of manipulation.

In adapting the microscope and camera for working together, both *may* be placed upon the top of a firm table, the microscope being in a horizontal position and the lens of the camera removed from its flange or setting. The centre of eye-piece in the microscope and that of the opening in camera front must be brought to the same plane above the table, and the tube of microscope inserted into the front opening of camera. The entrance of extraneous light may be prevented by simply wrapping about the tube at the junction, a piece of dark cloth or other opaque material. The microscope and camera are now in position for co-operative work, but since the slightest movement of either would change

the focus or even throw the object altogether out of the field of view, the two instruments must be securely fixed in position. The most ready method of doing this is to procure a piece of smooth flat board about three feet in length and from eight to ten inches wide; at one end of this firmly attach the camera, with its front facing the other end, to which is to be clamped the microscope, with its body lying horizontally, its eye-piece end inserted into the front of camera, as already detailed, and its optical axis coinciding exactly with centre of the ground-glass focussing-screen. This will leave ample room on the board for moving about of the radiant, be this an oil lamp, a gas-burner on a stand, or other device.

In the combination shown by Fig. 1, the camera being a small one, is required to be raised above the platform or board in order to make its centre coincide with that of the microscope, which is one of the cheap forms called the "Star." The mirror, as shown, is turned aside, so that the direct rays from the lamp may pass unobstructedly through the object on the stage. The lamp is a small one, with a half-inch wick, and is so constructed that the flame can be placed at whatever height above the table may be necessary to bring its centre into the optical axis of the microscope.

If much and varied work has to be done or the very best results are looked for, a specially designed camera will be necessary. The bellows length of nearly all ordinary cameras is entirely too short to afford sufficient range of amplification with a given objective, and they are deficient in numerous other respects. Many such instruments have been devised and are sold by the leading camera and optical manufacturers of America and Europe. Most of these are designed for use with the microscope inclined horizontally (altogether the best position for the majority of work), but some are vertical only, a form that seems to be rather common in Germany; being, in fact, necessary, if the object to be photographed is immersed in a fluid and moving freely therein. The exercise of a little skill and ingenuity will enable any one to apply an ordinary camera to a vertical microscope in much the same manner as has been described for their horizontal union, and this will probably suffice for the rare occasions when it becomes necessary to use them in this position. The Bausch & Lomb Optical Company make a camera which can be used vertically, horizontally,

or inclined at any desired angle, an excellent instrument, well made and fairly simple. This was brought out during the past year, but was antedated by my own "Autograph" camera, embracing the same points, which was shown at the Ithaca meeting of the American Microscopical Society in 1895, and which has met with considerable favor.

FIG. 2.
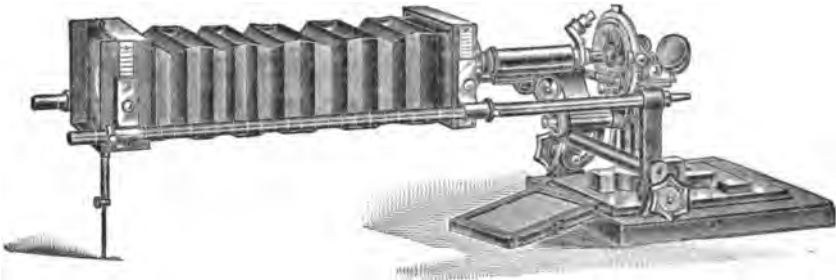
Fig. 2 shows the Bausch & Lomb camera in horizontal position. Two stout metal arms, carrying the camera, are immovably fixed to a revolving axis, thus permitting the apparatus to be tilted to any desired angle, where it is fixed by two heavy hand clamps, as may be seen in the figure. A jointed telescoping rod, also shown in Fig. 2, is attached to the upper end of the camera, to act as a support when in the horizontal position, and folding down parallel with the bellows, so as to be out of the way, when used in any other.

A valuable feature of this combination is that the microscope can be placed in any desired position and the camera adjusted to it. Then the bellows can be raised and the microscope used as though no camera were present. When an object is to be photographed, the bellows may be slid into position without in any manner disturbing the arrangement of light or object, the final focussing on the ground-glass being effected by means of the fine-adjustment screw. The exposure having been made, observation through the microscope may be resumed by simply raising the bellows again. One of its shortcomings is the absence of any device for adjusting the focus when the camera is extended to its full length. The distance then is so great—over thirty inches—from the ground-glass screen to the fine-adjustment screw of the

microscope as to render it almost impossible to see the image on the one and manipulate the other coincidentally. This defect does not exist in my own "Autograph" camera, but in other respects, I candidly admit, the instrument has several advantages over the latter.

Fig. 3 shows the "Autograph" camera in vertical position and as arranged for photographing an opaque object by the light of a coal-oil lamp concentrated upon it with a bull's-eye condenser. Like the preceding instrument, it can be placed horizontally or vertically, but between these two positions is constructed for use at an angle of 45° only, being held with equal firmness in either. When used horizontally, the fine adjustment is manipulated by means of a rod with a large milled head at the end next to the observer, and a grooved pulley wheel, adjustable at any point on the rod, which moves a cord passing around a groove in the periphery of the fine-adjustment screw. When fully extended, the distance is about thirty inches from the focussing-screen to the object on the stage, with a tube length to the microscope of two hundred and ten millimetres. The frame carrying the focussing-screen and plate-holder is reversible, for use horizontally or vertically, as may be rendered necessary by the position or shape of the object. The full size of the plate is four by five inches, but the holder is provided with kits for using three and one-quarter by four and one-quarter or two and one-half by two and one-half sizes as well. It is a good and useful instrument, but, as stated, the more recent Bausch & Lomb device has some advantages over it.

It may not be amiss to glance at one or two other small cameras designed especially for micrographic work, which have attracted my attention during the last twenty years, before describing the latest forms in use at the present day. One of these, Fig. 4, long known as "The Handy" photomicrographic camera, owed its origin to a scientific friend, Mr. H. Wingate, of Philadelphia, whose special field of work lay in an exhaustive study of the usually minute fungi comprised by the family of myxogastres. He was an expert draughtsman and his drawings were marvels of perfection, but their production required a vast expenditure of time and labor. Finding it impossible to purchase any form of camera small and compact enough to stand upon the work-table ready for instant use, to which his microscope could be applied without disturbing the subject under

observation, and necessitating no change other than its being tilted to the horizontal position, he set about making one for himself. Being quite as expert in the use of a pocket-knife and glue-pot as of the microscope, his determination quickly took practical shape. A square box of heavy card-board, blackened on the interior, with a short projecting cone, formed the camera, which was firmly attached to a stout piece of iron fitting from a steam-pipe, making a very

FIG. 4.
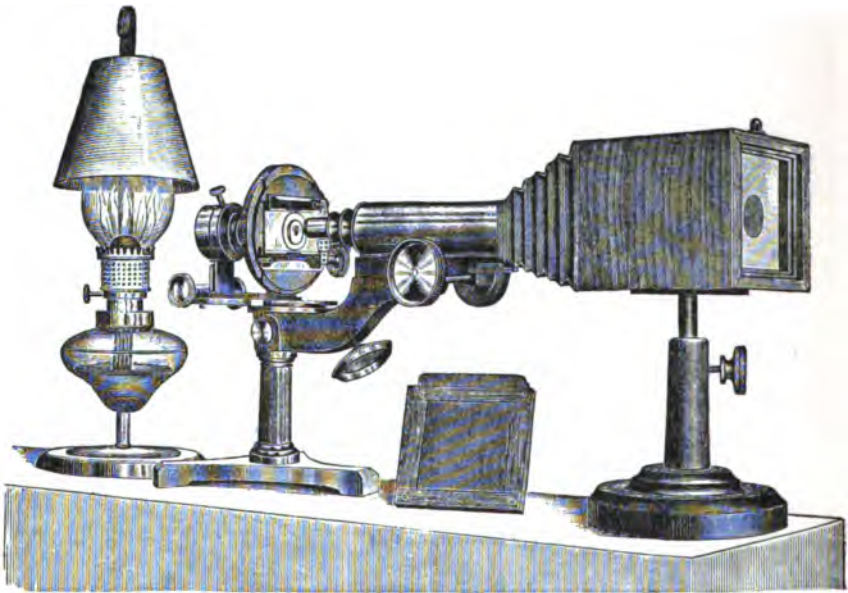
firm and steady base for its support at the proper height to suit the horizontally inclined tube of the microscope. The plates were only two and one-half by two and one-half inches, this small size exactly suiting his work, and were carried in a holder of that size which had been made for a so-called pocket camera, long since out of the market. The focussing-screen, of extremely fine ground-glass (also home made), was fitted in a frame which slid into the same groove as the plate-holder, the two coinciding exactly as to focus. There being no bellows extension, but little variation in amplification of any given objective could be obtained, necessitating the use of object glasses of different powers as became necessary. This, however, made but little difference to Mr. Wingate, as most of his work

PLATE I.

FIG. 1.—"Star" microscope and camera.
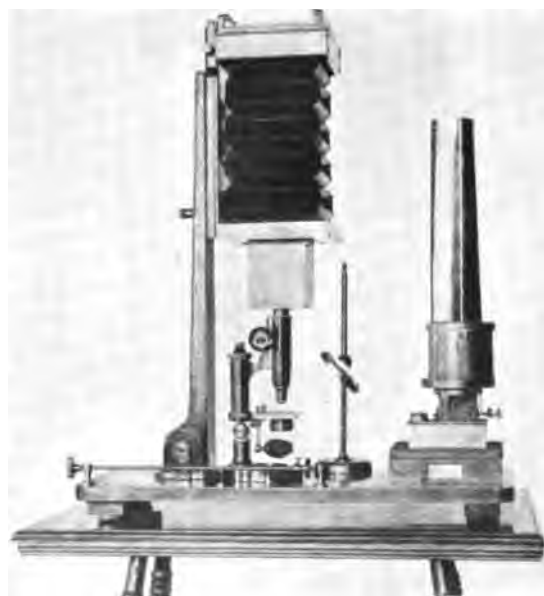
FIG. 3.—"Autograph" camera, upright

PLATE II.
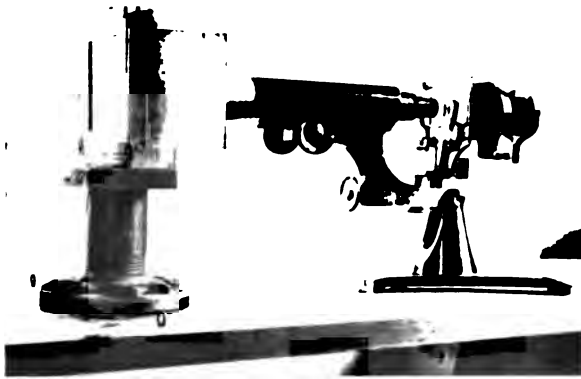
FIG. 5.—Wingate's home-made camera.
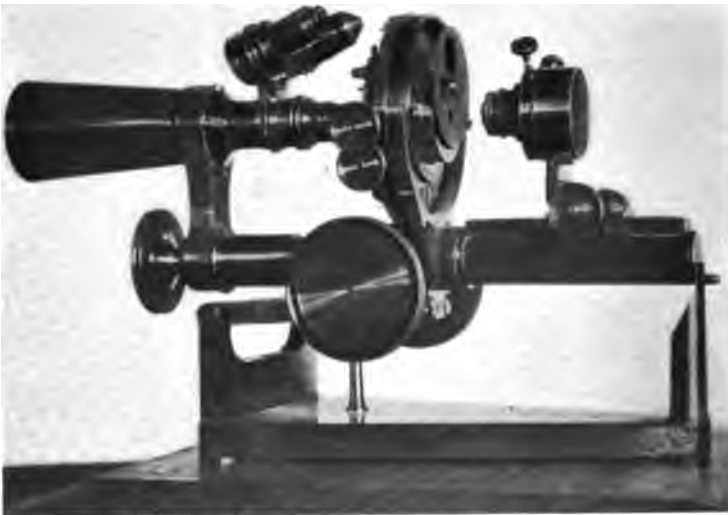
FIG. 7.—Author's special microscope, with cone body.
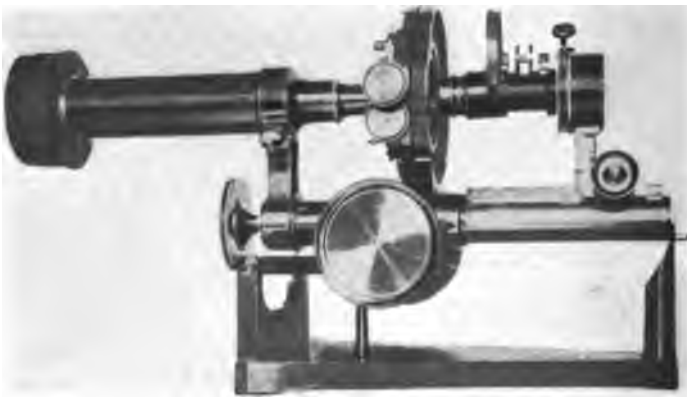
FIG. 8.—Author's special microscope, with compound body.

was done under about two hundred and fifty diameters, with a one-eighteenth dry lens without ocular, as was then the usual practice in this country. Fig. 5 shows his arrangement.

The camera made by Mr. Wingate could be used only with the microscope for which it was designed, but, seeing its exceeding usefulness in many ways, I devised the "Handy," on the same lines and carrying the same size of plate, which was applicable to any microscope stand having inclination of body. It had an extension cone-bellows front, focussing-screen with central clear spot, and was mounted on a stout base in such manner as to permit raising or lowering to any desired height. The arrangement is clearly shown in the illustration. It met with great success during a number of years, and I still regard it as a valuable adjunct to the work-table, even though a larger and more elaborate outfit be available. A single one was indeed made for four by five plates, which has been and still is treasured by its owner as an indispensable part of his work-room appliances. This was, of course, mounted upon a larger and firmer base, but in all essentials it was precisely the same as the smaller instrument. Illustrations from negatives made years ago with this little camera will be found on Plates VI. and VII., also Fig. 4, Plate IX.

Numerous other devices for cameras specially intended for photomicrography have seen the light during these years, and doubtless more will be added to the number as time progresses, for there is ever room for improvement in all things mundane. The limits of this article, however, will not permit more than mention of some, and a description of the form devised by myself many years ago and constantly used in almost daily work since. The Bausch & Lomb Optical Company have recently completed a camera which is the result of long experience in manufacture, aided by suggestions from many experienced practical workers. I have not seen it, but, from the well-known ability of this eminent house and from descriptions of the instrument sent me, have no doubt that it is the most perfect of its class as yet produced in America. It is of the horizontal form, and seems to combine every device necessary for rapid and accurate work.

Almost twenty years ago, in the earlier days of my devotion to this fascinating and most important branch of photography, I devised a camera which was made for me by the Scovill Manufac-

turing Company (now Scovill & Adams Company, of New York) in the most satisfactory manner, and afterwards introduced by them commercially as the " Walmsley Enlarging, Reducing, and Copying Photomicrographic Camera," a rather formidable title, but one which describes the capacities of the instrument very thoroughly. It is still made by that house, and in my opinion has not been much improved upon by any one. Indeed, its main features have been adopted (without acknowledgment) by other manufacturers, a mute tribute to its general excellences.

This camera is made in two sizes, six and one-half by eight and one-half inches and four and one-quarter by five and one-half inches, both, however, carrying smaller plates (down to three and one-

Fig. 6.
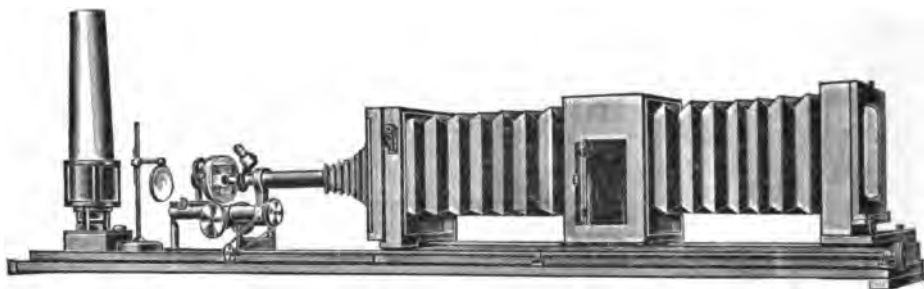
The open door in central support of camera is here shown.

quarter by four and one-quarter inches). A special one—ten by twelve—was made some years ago for a physician of Hartford, Connecticut, but was rather too large for convenient use in micrography, though eminently adapted for enlarging on bromide paper up to its extreme size. The smaller size is more convenient for the work originally intended in its design, and is the one in use by myself. The accompanying illustration (Fig. 6) gives such excellent outlines as well as details of its structure as to render an extended description superfluous. The bellows are in two sections, with a central support to prevent sagging, also for carrying the photographic lens used in enlarging and making lantern slides by reduction. The entire extension from stage of microscope is fifty-two inches, sufficient to give an amplification of more than four thousand diameters with a one-twelfth-inch immersion objective and a Spencer one-inch aplanatic ocular. The fine adjustment is controlled by a rod having a milled

PLATE III.

FIG. 9.—Author's special microscope, with body removed.

FIG. 10.—Author's special microscope and camera arranged with cone-body to microscope for use without ocular.

FIG. 11.—Camera slid back to give access to microscope for arranging illumination and focussing.

FIG. 12.—Apparatus arranged for high-power work.

PLATE IV.

FIG. 13.—Author's acetylene lamp.   For use with the microscope or in photomicrography.

head at the end nearest the observer and an adjustable grooved wheel, which operates a cord passing around the micrometer-screw of the microscope in a groove cut for the purpose. The cone-bellows front may be replaced by a front-board carrying the photographic lens, for use in copying, etc.

A second board (also removable) in the central division, carries the same lens when employed for lantern slide making or *photo-macrography*. For these purposes the front shifts in both vertical and horizontal planes, enabling the operator to bring any portion of a negative or microscopic object into the desired position. A number of persons using these cameras have expressed themselves as pleased with the ease with which the instrument is manipulated.

Although—as already stated—any microscope may be used in photomicrography, it is highly desirable to have a stand particularly designed for that purpose, as well as a special camera. In many instances it may be impossible to procure other appliances than those regularly furnished for students' use, and I have endeavored to show that these can be made to answer exceedingly well. But if a stand has to be purchased, it should by all means possess certain features which are almost indispensable where much and accurate work is to be done. It must be firm and steady in all positions. The stage should be controlled in rectangular movements mechanically, and revolve concentrically. It should also be provided with stop for Maltwood finder, and the specimen-slide should be firmly held by its edges and not by spring clips on top. The substage should have movements by rack and pinion, and carry an achromatic condenser with triple combination of not too wide numerical aperture and a complete set of stops. The compound body should be of large diameter, closing quite short telescopically. The usual Huygenian eye-pieces not being well adapted to photomicrographic purposes, a Spencer aplanatic is recommended as being altogether the best for use with *achromatic* objectives and should be included in the outfit. With *apochromats,* however, a compensating or projection ocular is absolutely necessary to complete their corrections.

Microscopes embracing most of these features are to be had from several makers, but there can be no question as to the great superiority of the photomicrographic stand of Zeiss. In excellence of design and perfection of mechanism it stands unrivalled. Some-

what costly at the outset, it will be found cheap to the full meaning of that much-abused word in the long run.

Long before this stand was introduced, in fact almost a score of years ago, recognizing the need of a better form than was procurable, I designed an instrument for the purpose, which the Messrs. Beck made for me in an entirely satisfactory manner, though its workmanship would not compare with that of Zeiss's best work of the present day. If, however, I could have a stand combining its salient features with various improvements to be found in that of Zeiss, together with the superb workmanship of the latter, I think nothing yet made could equal it. Figs. 7, 8, and 9 convey more accurate information as to its general form and details than would be possible in any written description. It is equally adapted to table or photographic purposes, and can be used vertically, at various inclinations, or horizontally, as may be required. In the latter position the optical centre is but five and one-half inches above the plane of the table, giving it wonderful steadiness and solidity. The stage is circular in form, revolving concentrically, with mechanical rectangular movements. The substage is moved by rack and pinion and supplied with centring adjustments. The double mirror is entirely removable when the stand is used for photographing, as shown in Figs. 7 and 8. The former also shows a revolving diaphragm fitted to the under side of the stage and a single-system achromatic condenser to the substage, both of which were long since discarded in favor of a wide-angle condenser with an elaborate system of diaphragms, as shown in Figs. 8 and 9. The fine adjustment is extremely delicate, responding promptly to the slightest touch upon the micrometer-screw.

Two bodies are provided,—a regular compound one, with tube lengths of one hundred and sixty to two hundred and ten millimetres, clearly shown in Fig. 8, and a cone-shaped short one, as seen in Fig. 7. The cone body is employed when the objective is used alone for projection without an eye-piece, as was formerly the almost universal practice, and which is very useful at times, especially for low amplifications, as in *photomacrography*. Both bodies are attached to the stand by a carefully made bayonet catch, and can be interchanged in a moment. Fig. 9 shows the stand without either body, and with mirror attached, for table work with the compound tube and eye-piece.

PLATE V.

FIG. 14.—Welsbach burner, mounted for photomicrography.
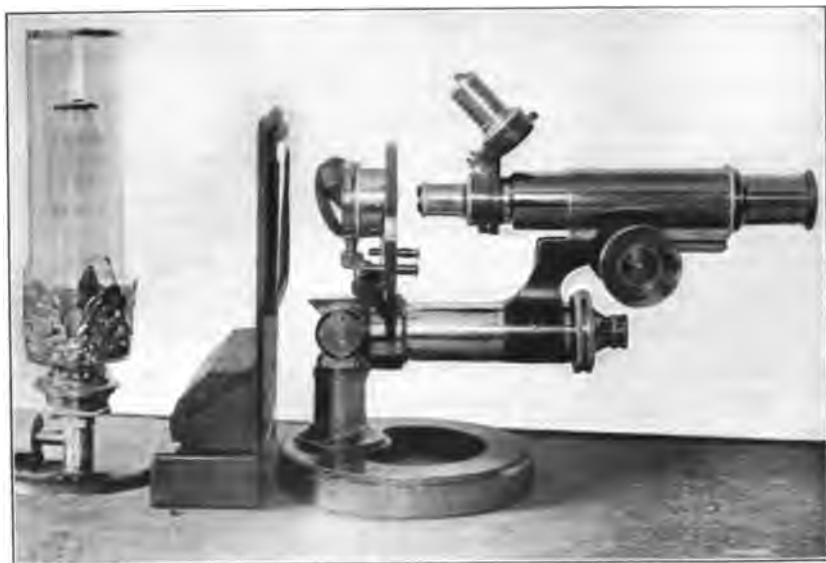
FIG. 15.—Welsbach burner, and holder for color-screens, as adapted to a students' form of microscope.

Figs. 10, 11, and 12 show the various methods of using the E. R. & C. camera in combination with this special microscope, which apply to any other form of the latter instrument.

When using the cone body in photomacrographic and low-power work, the centring of light, arrangement of subject, and focussing are all done on the ground-glass screen, as shown in Fig. 10. With medium and high powers, the compound body with eye-piece is employed. In this case the camera is slid back on its ways, as shown in Fig. 11, leaving microscope free and unobstructed for arrangement of light, object, etc., as in ordinary microscopical work. When all adjustments are completed, the camera is moved forward and attached by a double, blackened cap to the microscope, as shown in Fig. 12. The large cap on the end of the microscope body slides over the smaller one on the camera, effectually preventing the entrance of light at that point. The cone-bellows front allows the racking of the compound body in or out to any extent without moving camera.

In the choice of objectives but little chance exists of going astray. There is such a general excellence among the various makers at home and abroad as to leave small room for preference. Certain manufacturers seem to excel in some powers, but, as a rule, one is quite safe in selecting lenses by any responsible maker. These should range about as follows: One and a half inches, three-fourths or two-thirds inch, one-half or four-tenths inch, one-sixth inch, and one-twelfth inch homogeneous immersion. With such a battery every description of photomicrography embracing medium and high amplifications may be done; but for very low powers, including those under ten diameters, which I have called *photo-macrographs,* other lenses are requisite,—as the usual, two-, three-, and four-inch objectives of American and English makes. Leitz has recently introduced a series of three objectives, of respectively twenty-four millimetres, forty-two millimetres, and sixty-four millimetres focus, for very low-power work, than which nothing could be finer. Under the name of Micro-Planars, Zeiss also has a series of four lenses, of from twenty millimetres to seventy-five millimetres focus, for very low amplifications. Most of these lenses, however, require very wide tubes to the microscopes and special screws, which cannot be found in the usual stands. They are used without eye-pieces, and it may be added that all of the *achromatic*

objectives named above can be employed with or without oculars, as desired. The Huygenian form *may* be used with the *achromats,* but it is far better to employ an aplanatic eye-piece, as made by Spencer, in photomicrographic work. With *apochromats,* however, compensating or projection oculars *must* be used to complete their corrections.

The best quality of regular photographic lenses of the rectilinear type are exceedingly well adapted to slight amplifications of many microscopic subjects in connection with a suitable camera and without a microscope. I have used them for years in very low-power work,—under ten diameters,—in connection with the "Enlarging, Reducing, and Copying" Camera. Lenses of from three to seven inches focus are the most suitable in *photomacrographic* work. Examples of their excellent performance are shown in Figs. 33, 34, and 35.

A considerable list of accessories might be given, all of which are highly convenient, but not all are absolutely necessary. Among these the most important is a first-class achromatic condenser with suitable stops, to be used in the substage. These are to be had of most makers; Zeiss perhaps furnishes the best, but that of Ross & Co. leaves little to be desired. A bull's-eye condenser on stand is also indispensable. If within one's means, the list should include a polarizing apparatus, paraboloid, parabolic reflector for illuminating opaque objects under low powers, and an opaque illuminator for high ones, to be carried above the objective. With such an outfit almost any description of photomicrography may be undertaken.

The source of light is a most important subject. Fortunately, the student has a considerable range of choice, covering almost any circumstance in which he may find himself placed. Sunlight, if directed and controlled by a heliostat, is without doubt the chief among illuminants in purity, quickness, and general excellence. In our fortunate country, so blessed with continuous days of sunshine, it is the prime favorite as a radiant with those who have ever employed it. But, after all, these are few in comparison with the multitude of workers. Diffused daylight is good, very good, but so uncertain as to actinic value at different hours and seasons that it also is but little used. Both of these, of course, demand day-work, in which but few have time to devote to photomicrography.

PLATE VI.
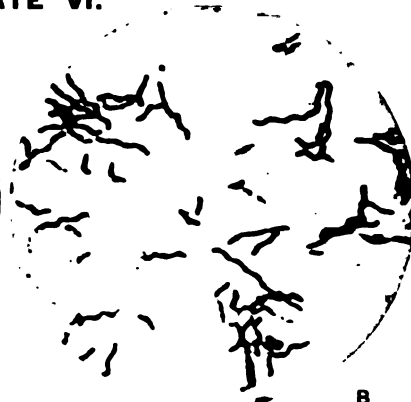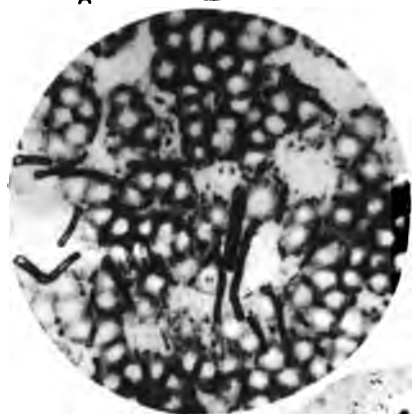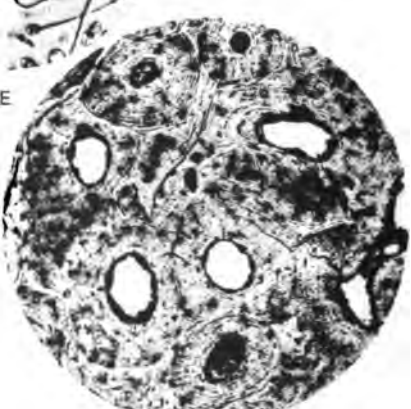
PLATE VI.

A. Subject, proteus vulgaris. × 1000. Objective, Beck's one-twelfth oil imm., Students' series. Ocular, Spencer aplanatic. Condenser, Ross's achromatic. Radiant, acetylene, one-half-foot burner. Plate, " Eagle" orthochromatic. Screen, aurantia, dark-orange. Exposure, one minute. Developer, hydroquinone.

B. Subject, spirillum rubrum. × 1000. Objective, Bausch & Lomb's one-twelfth oil imm., Students' series. Ocular, Huygenian No. 4. Condenser, Abbé chromatic. Radiant, acetylene, one-half-foot burner. Plate, Carbutt orthochromatic 23. Screen, dark-yellow glass. Exposure, seven minutes. Developer, eiko-hydro powder.

C. Subject, bacillus anthracis in blood of calf. × 750. Objective, Leitz's one-twelfth oil imm., Students' series. Ocular, Huygenian No. 1. Condenser, Abbé chromatic. Radiant, acetylene, one-half-foot burner. Plate, Carbutt orthochromatic 23. Screen, acid green. Exposure, ten minutes. Developer, metol-quinol.

D. Subject, head of fœtal femur—human. × 110. Vertical section, showing transition from cartilage to bone. Objective, Beck's first-class four-tenths. Ocular, none. Condenser, none. Radiant, coal-oil lamp. Plate, landscape, make not noted. Exposure, five minutes. Developer, pyrogallol.

E. Subject, human spermatozoa. × 280. Objective, Tolle's dry one-fifteenth. Ocular, none. Condenser, achromatic. Radiant, coal-oil lamp. Plate, Harvard No. 40. Exposure, two minutes. Developer, hydroquinone. " Handy" camera work.

F. Subject, eggs of trichocephalus dispar in human intestine. × 195. Objective, Beck's one-sixth, Students' series. Ocular, none. Condenser, none. Radiant, coal-oil lamp. Plate, Carbutt orthochromatic 16. Screen, Denison's yellow tissue-paper No. 26. Exposure, five minutes. Developer, pyrogallol.

G. Subject, human tibia, transection. × 65. Objective, Beck's first-class two-thirds. Ocular, none. Condenser, none. Radiant, coal-oil lamp. Plate, Cramer's " Banner." Exposure, one minute. Developer, pyrogallol.

PLATE VII.

H. Subject, mucous membrane from nose of sheep, vertical section. × 110. Objective, Beck's first-class four-tenths. Ocular, none. Condenser, none. Radiant, acetylene, one-half-foot burner. Plate, Carbutt's B. Screen, cobalt blue. Exposure, five minutes. Developer, hydroquinone.

I. Subject, carcinoma of prostate gland. × 50. Objective, Powell & Lealand's first-class one-inch. Ocular, Huygenian, one and a half inches. Condenser, Ross's achromatic. Radiant, acetylene, one-half-foot burner. Plate, "Eagle" orthochromatic. Screen, dark-green glass. Exposure, two minutes. Developer, eiko-hydro powder.

This print, with letter O of same plate, are from preparations by Dr. Jacobson, of Syracuse, New York.

J. Subject, ganglion, spinal cord of calf, vertical section. × 30. Objective, Beck's four-tenths. Ocular, none. Condenser, none. Radiant, coal-oil lamp. Plate, Carbutt orthochromatic celluloid film. Screen, none. Exposure, fifteen seconds. Developer, hydroquinone.

K. Subject, human scalp; flat section, cutting hairs transversely. × 28. Objective, Beck's first-class two-thirds. Ocular, none. Condenser, none. Radiant, coal-oil lamp. Plate, Harvard No. 40. Exposure, forty-five seconds. Developer, eiko-hydro.

L. Subject, sarcoma, small round-cell. × 115. Objective, Beck's one-sixth, Students' series. Ocular and condenser, none. Radiant, coal-oil lamp. Exposure, five minutes. Developer, eiko-hydro.

M. Subject, sarcoma, giant-cell. × 90. Objective, Beck's first-class one-fifth. Ocular and condenser, none. Radiant, coal-oil lamp. Exposure, four minutes. Developer, eiko-hydro.

N. Subject, mucous membrane, uterus of sow. × 27. Objective, Beck's first-class one and a half inches. Ocular, Huygenian one and a half inches. Condenser, none. Radiant, diffused daylight. Plate, Carbutt "Eclipse." Exposure, two and a half minutes. Developer, eiko-hydro powder. Opaque injection. "Autograph" camera, used upright.

O. Subject, sarcoma of tonsil. × 110. Objective, Ross's first-class two-thirds inch. Ocular, Spencer's aplanatic. Condenser, Ross's achromatic, front combination removed. Radiant, acetylene, one-half-foot burner. Plate, Forbes orthochromatic L. Screen, aurantia, deep orange. Exposure, forty seconds. Developer, eiko-hydro powder.

PLATE VII.

H

I
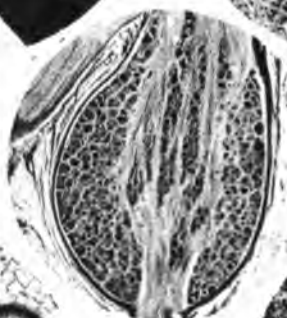
J

K
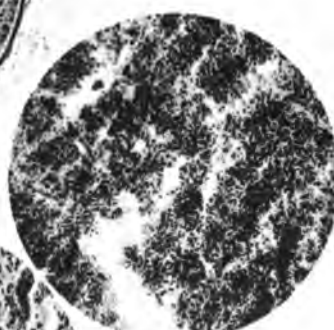
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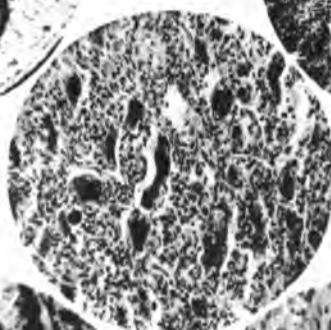
M
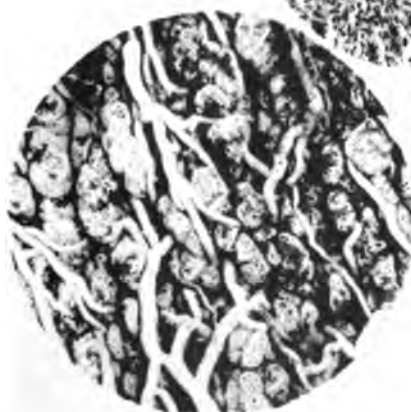
N
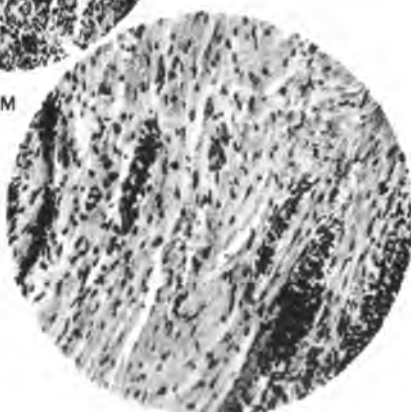
O

For the night-workers, however, there are left numerous first-class radiants to suit their choice or surroundings. The electric-arc light is now available almost everywhere, and next to direct sunlight is without doubt the very best illuminant. The lime-light is also excellent. It is largely used in England, being there the favorite with the highest authorities. The convenient manner in which the gases are furnished, together with low prices demanded for them, probably have much to do with the popularity of this radiant among English photomicrographers. In this country, however, it is not, so far as I can learn, very extensively employed.

Then we have the "old reliable" coal-oil lamp, to be found everywhere, ready at a moment's notice to lend its rays to our work, and to a most excellent purpose as well. For there can be no doubt that in almost every department of photomicrography as good results may be obtained with this familiar illuminant as from any other radiant so far known, if time and patience be given to the work. Its yellow rays are better than white ones in very many cases. One of the finest photographs of Amphipleura pellucida that I ever saw was made by them. So let him who can obtain no other light-source take heart. If he use his tool well, it will do his work. The lamp should have a single wick only, and be so mounted that the centre of the flame may be made to coincide with the optical axis of the microscope as shown in Fig. 4.

Ever since acetylene gas was introduced I have used it almost exclusively as the radiant in my photomicrographic work. A small automatic generator which I constructed at that time, supplies the gas, consuming (for my work) about one pound of carbide per week, the gas being always "on tap." At times I use a burner consuming one-half foot of gas per hour, but generally employ one which burns but one-eighth of a foot in the same time. This burner I constructed originally for a microscope illuminator, it being so arranged as to stand at any desired height above the mirror and to incline at all angles which may be necessary. The flame is a solid column of the most intense white light, " a chunk of sunshine" brought down to the table, about the thickness of a small quill and some one and one-half inches long. A test of its photographic capacity was so unexpectedly gratifying that I have since used it almost exclusively in this work. The illustration Fig. 13 shows its construction quite well. I may add that the

white lining to chamber containing the burner, is replaced with a dead-black one when the light is employed for photography. A strip of microscopic-object glass three inches by one inch is used to close the front of the little lamp, as shown in the illustration.

Magnesium ribbon is also a most excellent illuminant when properly burned. Its chief disadvantages are the smoke and dust attendant upon its burning, and the cost.

Finally, we have the incandescent gas burner (Welsbach), which is absolutely condemned by all recent English authorities, being merely noticed in their several works as entirely unsuited to photomicrography. This is undoubtedly the case in "critical" illumination of difficult test objects for their most perfect resolution; since the image of incandescent mantle is brought into focus with the flame and object on stage coincidentally, and of course appears in the negative together with details of the microscopic specimen. For this class of work the Welsbach mantle will not answer, but it comprises a very small percentage of the great photomicrographic field. The remedy in all cases outside of those absolutely requiring "critical" illumination, is to rack the *achromatic* condenser slightly towards the stage, or away from it (preferably the former), until image of the mantle disappears, and the field is uniformly lighted. Since "critical" illumination is not possible with the Abbé *non-achromatic* condenser,—universally applied to students' forms of microscopes,—this one shortcoming of the Welsbach light is really of no consequence to the great majority of photomicrographers. In all other respects it is admirable. From it we have a radiant and brilliant white light; more highly actinic than coal oil (though not so much as acetylene), very easily managed, cheap, and almost as universally available as the coal-oil lamp itself, since gas is now laid on in nearly every town in the world. A neat little lamp (Fig. 14), specially adapted to photomicrography, is furnished by the Welsbach Company at a trifling cost. Fig. 15 shows it as adapted to a student microscope in connection with a stand for color screens. Illustrations of photomicrographs made by its light are also given under Figs. 26, 27, and 28. In use, the burner is enclosed in a sheet-iron tube with opening in front in order to cut off extraneous light from the work-room.

Excepting comparatively few cases, photomicrography has to deal with transparent objects, the majority of which are both viewed

PLATE VIII.

FIG. 16.—Subject, human muscle—voluntary. × 200. Transparent injection of the arteries. Objective, Beck's first-class one-fifth low angle. Ocular, Spencer's aplanatic. Condenser, Ross's achromatic. Radiant, acetylene, one-half-foot burner. Plate, Carbutt orthochromatic 23. Screen, yellow glass. Exposure, three minutes. Developer, hydroquinone.

FIG. 17.—Subject, small intestine of rabbit, transection. × 17. Objective, Beck's first-class one and one-half inch. Ocular and condenser, none. Plate, Cramer isochromatic, slow. Screen, none. Radiant, acetylene, one-eighth-foot burner. Exposure, fifteen seconds. Developer, eiko-hydro powder.

PLATE IX.
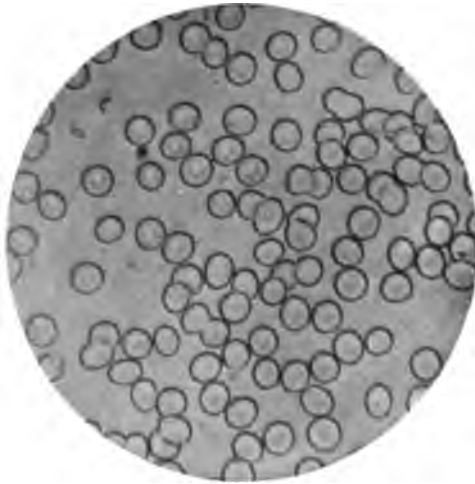
FIG. 18.—Subject, human blood-corpuscles, red, normal. × 500. Objective, Beck's first-class one-fifth wide angle. Ocular, Spencer's aplanatic. Condenser, Ross's achromatic. Radiant, coal-oil lamp. Plate, Carbutt B. Screens, napthol yellow and acid green. Exposure, ten minutes. Developer, metol-quinol.

FIG. 19.—Subject, human blood-corpuscles, normal. × 445. Showing one white corpuscle in field. Objective, Tolle's dry one-fifteenth, with Tolle's achromatic amplifier in microscope tube. Ocular, none. Condenser, achromatic. Radiant, coal-oil lamp, slightly oblique. Plate, Carbutt orthochromatic celluloid film. Screen, none. Exposure, four minutes. Developer, hydroquinone.

FIG. 20.—Subject, human blood-corpuscles showing poikilocytosis. × 280. Objective, Beck's one-sixth, Students' series. Ocular, none. Condenser, bull's-eye. Radiant, coal-oil lamp. Plate, Harvard 40. Exposure, four minutes. Developer, eikonogen.

and photographed by ordinary transmitted light, either direct from the radiant or condensed by various appliances. Certain subjects, although transparent, are, however, much better shown if the light rays illuminating them do not enter the microscope tube, but are thrown at such angles as to pass beyond the front of the objective, thus showing the object brilliantly illuminated on a dark field or background. This is effected in a variety of ways,—by means of a paraboloid; with proper central stops in the condenser, or by making the print from a positive, as suggested by my friend Dr. A. C. Mercer, of Syracuse, New York. The latter process is particularly applicable to high-power work. A sample illustration is shown in Fig. 24, with a description of the methods I employed. Other transparent objects, as many crystals, some of the starches, etc., require polarized light for the more perfect delineation of their beauty or structure, for which, of course, a polariscope must be used. It is recommended in selecting this to purchase one with a large Nicol prism as the polarizer. My own measures sixteen millimetres across the end and transmits an immense amount of light. Fig. 25 is an example of this method of illumination.

Opaque subjects have less often to be dealt with, but are by no means rare. Diffused daylight is the most generally useful illuminant, in my experience. The lighting is more even and softer than that of any other which I have used. Examples are shown in Fig. 23 and N, Plate VII.

In the photographic portion of our work the sensitive plate is of prime importance. Although any brand of gelatine dry plates *may* be used with success, there is no doubt that orthochromatics are greatly superior for most of this work to those of ordinary make. Of American plates it is probable that Cramer's isochromatics, when fresh, are among the best, but they do not keep well, and are guaranteed by the makers for a short time only, a serious bar to their general usefulness. During the past year I have employed exclusively, with the greatest satisfaction and success, the orthochromatic plates by Forbes, of Rochester, New York. These are furnished in two degrees of sensitiveness. In every particular they have met all requirements, *including excellent keeping qualities;* and, being considerably lower in price than the other so-called " standard makes," I can recommend them to fellow-workers.

Although particularly sensitive to the yellow, all of these plates

pass the other rays of the spectrum, rendering necessary the use of a screen to get true color values in the negative. Every one can make these for himself, quite as perfect practically as though wrought by a skilled optician at considerable cost. Yellow and orange are the two shades most generally required. To make these, place a few unexposed lantern-plates in a solution of sodium hyposulphite until the silver is all eliminated, leaving only a transparent film of gelatine upon the plate, which must be well washed in repeated changes of water until every trace of the hyposulphite is gone. For a yellow dye, have a solution of picric acid, or naphthol-yellow—about two per cent.—ready, in which place the plate for a few minutes or until completely stained. Then rinse under the tap just enough to remove all superfluous color, and place on a rack to dry. It must then be covered and the edges bound, as in the case of an ordinary lantern-slide. A solution of aurantia of similar strength will give an orange tint. All of these cut out the blue and violet rays more or less completely.

Quite frequently a thin section rather faintly stained has to be photographed, but possesses so little contrast that the resulting picture is most unsatisfactory. In such cases the use of a green screen greatly helps matters, even with ordinary plates. A two per cent. solution of acid green will give a screen of cold tone, but the addition of an equal quantity of one of the yellow baths will result in a most useful green of warm hue. The colors and tones may be varied at will, and, the cost being but little, it will be well to prepare a number of screens suited to all requirements. It is immaterial where the screen is fitted, provided no light from the radiant reaches the object without passing through it. In my own practice it is carried in a frame placed immediately behind the substage condenser, as shown in Figs. 10, 11, 12, 15.

The developer may be any of the numerous agents now in use, with which the photomicrographer is familiar, provided due density as well as detail can be obtained with it. If, however, he has had no prior experience or is not wedded to any particular agent, I would recommend the following, which has stood me in daily stead for many years and has never been superseded in my estimation by any other. For making four ounces of developing solution have ready two glasses, each containing two ounces of water. Into one put twenty grains of *powdered* sodium carbonate and five grains

PLATE X.
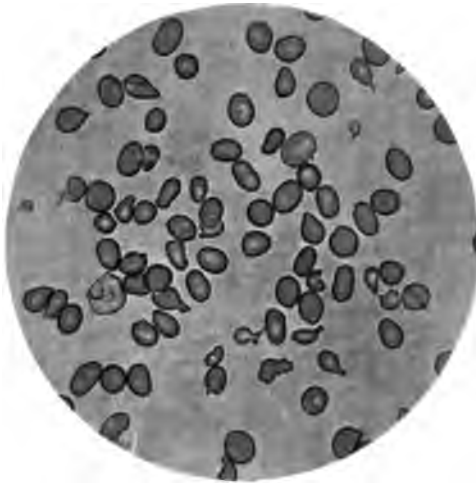
Fig. 21.—Subject, human blood-corpuscles, pernicious anæmia. × 390. Objective, Beck's first-class one-eighth. Ocular, none. Condenser, bull's-eye. Radiant, coal-oil lamp. Plate, Cramer "Banner." Screen, ground glass for diffusion of rays. Exposure, two and one-half minutes. Developer, hydroquinone.
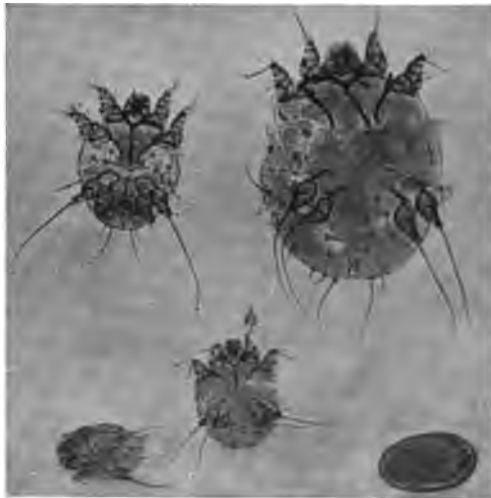
Fig. 22.—Subject, Sarcoptes scabiei. × 71. Adult male and female; young, nymphæ, and egg. Objective, Beck's first-class four-tenths wide angle. Ocular, none. Condenser, bull's-eye. Radiant, coal-oil lamp. Plate, "Eagle" orthochromatic. Screen, none. Exposure, twenty-five seconds. Developer, eiko-hydro powder.

PLATE XI.
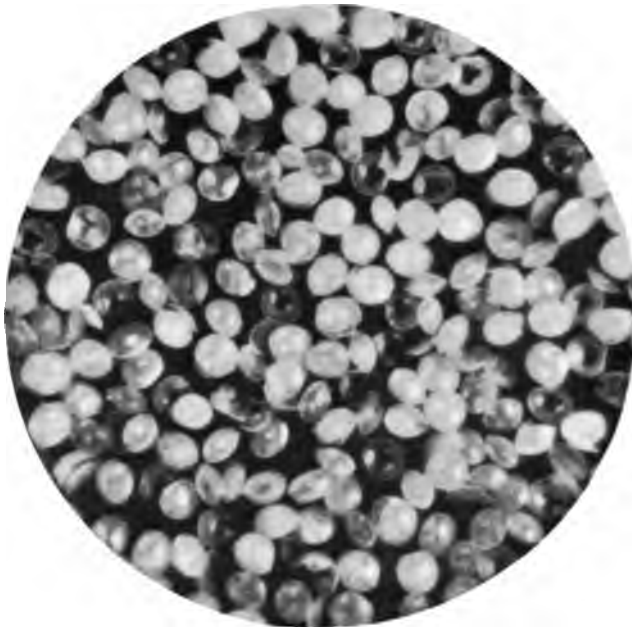
Fig. 23.—Subject, embryo oysters. (English.) Opaque. ✕ 32. Objective, Beck's first-class one and one-half. Ocular, Spencer's aplanatic. Radiant, diffused daylight from parabolic reflector. Plate, Wuestner's ' Cyclone." Exposure, thirty seconds. Developer, eiko-hydro powder.
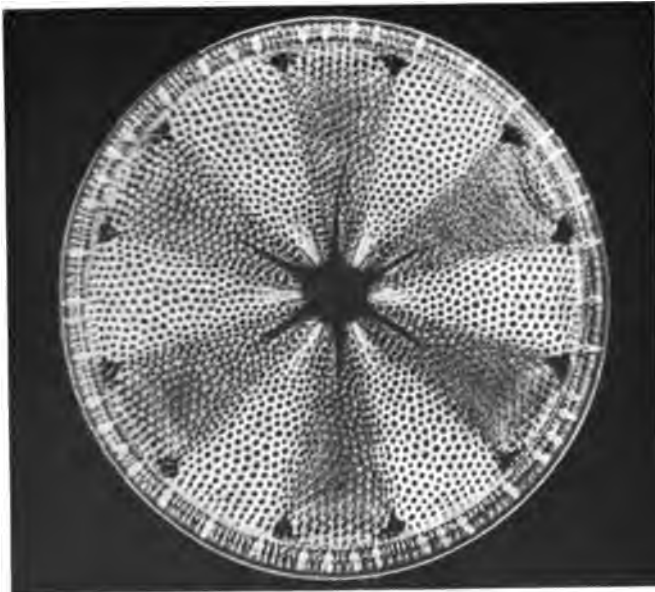
Fig. 24.—Subject, Heliopelta metii. Sun-shield diatom. ✕ 225. Transparent object on dark field. Objective, Beck's first-class four-tenths narrow-angle. Ocular, Spencer's aplanatic. Condenser, Ross's achromatic. Radiant, acetylene, one-half-foot burner. Plate, "Record" medium. Screen, cobalt blue. Exposure, two and one-half minutes. Developer, eiko-hydro powder.

A positive on glass was made from this negative by contact printing, from which in turn the dark-field print was made, as suggested by Dr. Mercer. I do not think so perfect a result with this considerable amplification could have been made in any other manner.

of *powdered* sodium sulphite, stirring with a glass rod until thoroughly dissolved. Into the other glass put ten grains of eikonogen and five grains of hydroquinone, stirring also until entirely dissolved. The two solutions may then be mixed in such proportions as are desired. In my own practice, so regular are the plates, exposures, and developers that the two-solution tentative method was long since abandoned and a single one made to take its place. With a fresh mixture, a few drops of bromide solution—ten per cent.— are generally used to insure density, but this is better secured by an addition of old developer to the fresh mixture. For the old should not be thrown away, but filtered into a bottle which must be tightly corked and which should be kept filled to the top. It seems never to lose its developing powers entirely. I have now a bottle which has not been emptied in more than four years, but will do its work to-day quite vigorously. It never becomes thick or turbid. If the bottle be full when an addition is to be made to its contents, sufficient is poured off to permit this.

As the materials for this developer will keep indefinitely, it is my practice to have them ready mixed in quantity, to save time in weighing out the small amount needed for each fresh solution, and I would recommend all workers to do the same. Prepare the powders as follows:

NO. 1.

Sodium carbonate, dried and powdered, 2 ounces ;
Sodium sulphite, dried and powdered, ½ ounce.

Mix very thoroughly on a sheet of clean paper; when the materials are completely incorporated, put them into a four-ounce glass jar with screw top.

NO. 2.

Eikonogen, 1 ounce ;
Hydroquinone, ½ ounce.

Mix these in like manner and put into a two-ounce jar as above.

Have a little dipper for each jar; that for No. 1 should hold about twenty-five grains and that for No. 2 fifteen grains. You will never use any other developing method if this be adopted. A grain or two of metol added to the solution will accelerate its action, but is not recommended.

It will frequently be found that negatives full of detail and otherwise excellent, are so deficient in density as to prevent getting

good prints from them. In this case recourse must be had to intensification. The recently introduced "Agfa" intensifier is excellent in certain classes of work, as landscapes, etc.; but in photomicrography I have not found it equal to the cyanide of silver intensifier, which I have used for many years. This is prepared as follows:

NO. 1.

Bichloride of mercury, 96 grains;
Bromide of potassium, 96 grains;
Distilled water, 12 ounces.

NO. 2.

Crystallized cyanide of potassium, 90 grains;
Nitrate of silver, 96 grains;
Distilled water, 12 ounces.
Shake well and allow to settle.

These are kept in separate bottles, and may be used over and over again until exhausted. The plate *must* be entirely freed from any trace of hyposulphite by repeated washings, and immersed in solution No. 1 until of a uniform gray color. Then wash well and immerse in No. 2, when it will quickly blacken all over, after which it must be thoroughly washed and placed in the rack to dry. If all is carefully done, there will never be any change in the plate afterwards.

If a plate be too dense, it can be reduced in Farmer's solution or a two per cent. solution of ammonium persulphate. There has also been an "Agfa" reducer introduced, but I have not tried it.

Any of the printing methods can be followed with good results. My own work is done almost entirely on the Velox glossy paper, which yields prints almost equal to those on glass surfaces, of agreeable tones, and brilliantly beautiful. This paper prints quickly by gas-light, so that the night-worker can do all, from negative to finished print, quite independent of daylight.

It seems proper to give brief descriptions of the processes used in making negatives under low, medium, and high powers, together with those adopted in producing photomacrographs by means of the camera alone.

Negative-making with Low Powers.—I have selected the subject—small intestine of a rabbit, Fig. 17, Plate VIII.—as a fair

PLATE XII.

FIG. 25.—Subject, crystals of ethyl æther of gallic acid. × 70. By polarized light. Objective, Beck's first-class two-thirds. Ocular, none. Condenser, none. Polarizing and analyzing prisms, Nicol. Radiant, coal-oil lamp. Plate, "Diamond." Exposure, two minutes. Developer, pyrogallol.

FIG. 26.—Subject, proboscis of blow-fly. × 160. Attempted "critical" illumination. Objective, Beck's first-class two-thirds. Ocular, Spencer's aplanatic. Condenser, Ross's achromatic, front combination removed. Radiant, Welsbach incandescent mantle. Plate, Forbes orthochromatic S. Screens, two—picric acid and acid green. Exposure, one and one-quarter minutes. Developer, eiko-hydro powder.

This print is introduced to show the shortcomings of this radiant in "critical" illumination and resolution. The image of the mantle is clearly seen, together with the object. The next illustration, however, shows first-class results when the condenser is slightly placed out of focus.
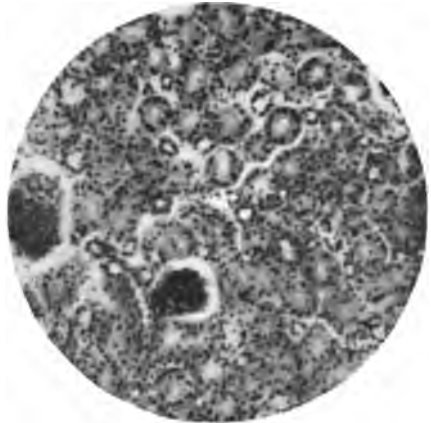
FIG. 27.—Subject, cortex kidney of cat, transection. × 105. Objective, Beck's first-class two-thirds. Ocular, Spencer's aplanatic. Condenser, Ross's achromatic, with front combination removed and racked forward a little out of focus. Radiant, Welsbach incandescent mantle. Plate, Forbes orthochromatic S. Screens, two—picric acid and acid green. Exposure, two minutes. Developer, eiko-hydro powder.

PLATE XIII.
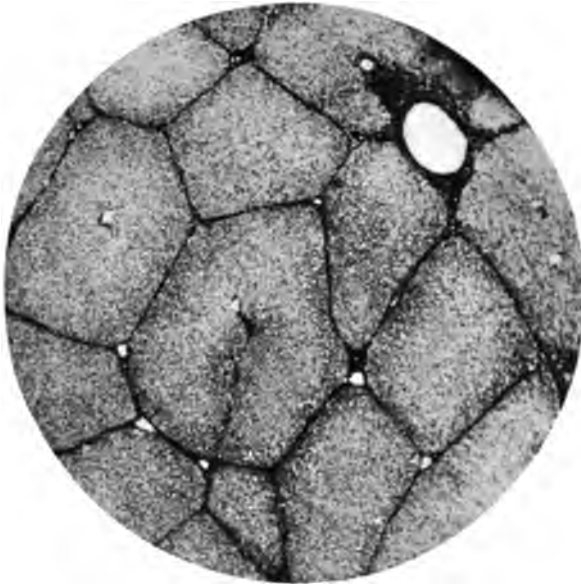
FIG. 28.—Subject, lobules, liver of pig. × 23. Objective, Beck's first-class one and one-half inches. Ocular, none. Condenser, bull's eye, to make rays of light parallel. Radiant, Welsbach incandescent mantle. Plate, Forbes's orthochromatic 8. Screens, three—picric acid, acid green, and ground glass. Exposure, eighteen seconds. Developer, eiko-hydro powder.

FIG. 29.—Subject, Bacillus tuberculosis in sputum. × 1000. Objective, Bausch & Lomb's one-twelfth oil imm., Students' series. Ocular, Huygenian 4. Condenser, Abbé chromatic, Radiant, acetylene, one-half-foot burner. Plate, Carbutt orthochromatic 23. Screen, dark-yellow pot glass. Exposure, seven minutes. Developer, eiko-hydro powder.

example of quite low-power work. This is a transverse section stained with carmine, fairly even and flat. Objective one and one-half inches, no eye-piece; illuminant acetylene, one-half-foot burner, rays parallelized by a bull's-eye condenser. The camera and microscope were connected before commencing work; and the centring of light and object, with focussing as well, were done entirely upon the ground-glass screen, its surface being quite fine enough for object and amplification. The plate was a Cramer slow isochromatic, exposure three seconds, and development with the eikonogen-hydroquinone powders already described. Enlargement seventeen diameters, measured with a stage micrometer. Negative good, of full density, and showing excellent detail.

Medium Powers.—Human voluntary muscle, injected, Fig. 16, Plate VIII., magnified two hundred diameters, may suffice for an example of medium-power work. In this case an ocular—Spencer's aplanatic—was used, the objective being a Beck one-fifth, of moderate angle, illuminant acetylene, condenser Ross achromatic. The specimen having been placed upon the stage, the camera was slid back as in Fig. 11, leaving the microscope free for manipulation. With the eye applied to the ocular, the light is moved about until the field is illuminated, when the object is focussed, the light being from twelve to fifteen inches from it, this accomplished, the condenser is racked forward or back until it projects an image of the flame sharply across the field of view from top to bottom and exactly in its centre. We now have both light and object together in focus; the field, however, will not be evenly illuminated, but dimly lighted only on either side of the brilliant line of flame in the centre. With a wide-angle objective of high power, say one-twelfth, the whole field is equally lighted, but with a one-fifth or lower this is impossible. There are two remedies,—either to move the condenser nearer to or farther from the object, in which case the radiant is no longer in focus, or to interpose a bull's-eye condenser about midway between it and the stage of the microscope, with its convex side towards the latter, and move it about until the field is fully and evenly illuminated. The camera is then slid back, attached to the microscope tube, and the object is arranged in the centre of the ground-glass screen. The bellows are then extended until the desired amplification is obtained, when we find the ground surface to be entirely too coarse for the final focussing and must have

recourse to some other method. One that I suggested many years ago seems to have met with approval and to have been very generally adopted. A dry plate is exposed for a second or two to white light and developed until a slight fogginess appears, when it is to be fixed at once in sodium hyposulphite, washed, and dried. This is then cut to the size of the ground glass in the screen and substituted for it, the coated side, of course, towards the object. On applying a focussing-glass to its back, the finest and most delicate details will be shown distinctly, and the focussing may be completed with the greatest accuracy. Or a piece of plate glass may take its place if the focussing-glass be employed. In fact, the air image as seen through such a lens is probably the best of all, when one has acquired the skill necessary to hold it in the right place. The focussing screw is moved by means of a cord attached to the rod and milled head shown in the illustrations. The plate used for this negative was a Carbutt orthochromatic rather slow, with a deep-yellow screen of pot-metal glass. The exposure was three minutes and the developer hydroquinone.

High Powers.—In high-power work the arrangements of radiant, condenser, etc., are substantially the same as with medium powers. High-class photomicrography, in all degrees of amplification, may be done with any of the radiants heretofore named and with the ordinary non-achromatic Abbé condenser, if none other be available. An example of work under a magnification of + 800 diameters is given in Fig. 31, made by use of this condenser and the Welsbach incandescent mantle as radiant, both of which are condemned as useless by the highest English authorities. In " critical" lighting and resolutions requiring radiant and object to be in focus together, an achromatic condenser and the edge of flame *must* be employed. With a first-class condenser of three systems, allowing the removal of one or more, and a full series of stops, this most important aid to perfect resolution may be used with all powers from quite low ones to the highest. Examples of " critical" work may be seen in Figs. 30 and 32, the first under + 400 diameters,—a medium amplification; the second, + 50 diameters,—about the same in low-power work.

It should have been stated that the exact centring of the achromatic condenser is an absolute necessity. To effect this a very low-power objective should be used and the smallest stop of

PLATE XIV.

FIG. 30.—Subject, fine hairs, tongue of blow-fly. × 400. Objective, Ross's first-class one-sixth. Condenser, Ross's achromatic. Ocular, Spencer's aplanatic. Radiant, acetylene, one-half-foot burner. Plate, "Eagle" orthochromatic. Screen, cobalt blue. Exposure, one minute. Developer, eiko-hydro powder.

A good example of "critical" illumination and resolution, with medium power.

FIG. 31.—Subject, secondary markings, tricnatium grande. × 800. Objective, Leitz's one-half dry. Ocular, none. Tolle's achromatic amplifier in microscope tube. Condenser, bull's eye. Radiant, Welsbach incandescent mantle. Plate, Harvard 40. Screen, none. Exposure, thirteen minutes. Developer, eiko-hydro powder.

A fair example of high-power non "critical" resolution.
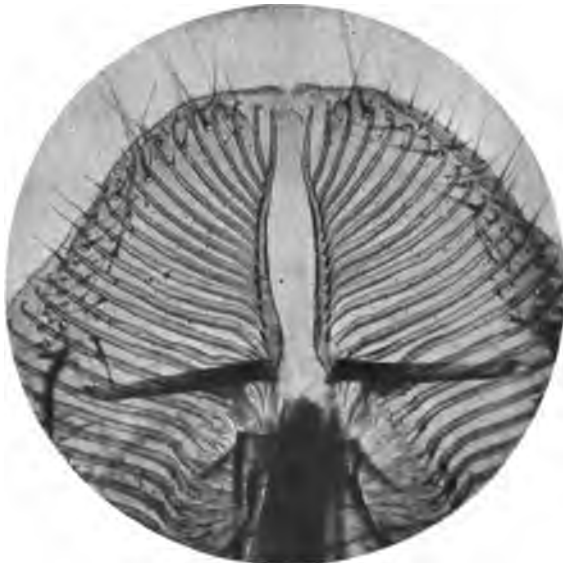
FIG. 32.—Proboscis of blow-fly. × 50. Objective, Ross's first-class two-thirds inch. Ocular, Spencer's aplanatic. Condenser, Ross's achromatic. Radiant, acetylene, one-half-foot burner. Plate, "Eagle" orthochromatic. Screen, green glass. Exposure, thirty seconds. Developer, hydroquinone.

A good example of low-power "critical" resolution.

PLATE XV.—Photomacrographs.
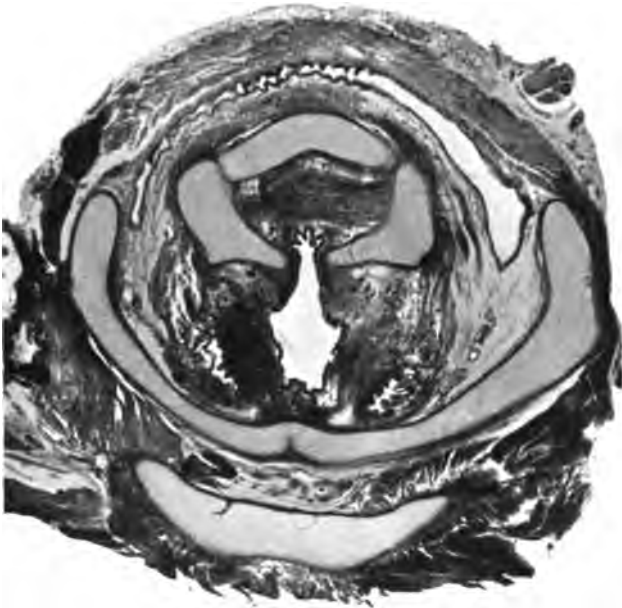
FIG. 33.—Subject, human larynx (fœtal), transection. × 7. Objective, Beck's five-inch rapid landscape lens at f/22. Radiant, diffused daylight from northwestern sky. Plate, Carbutt B. Exposure, ten seconds. Developer, pyrogallol. Enlarging, reducing, and copying camera.

FIG. 34.—Subject, cerebellum of cat (Betz method). × 6. Objective, Beck's five-inch rapid landscape lens at f/22. Radiant, diffused daylight from very cloudy sky. Plate, Carbutt orthochromatic 23. Exposure, thirteen seconds. Developer, eiko-hydro powder. Enlarging, reducing, and copying camera.

the condenser, which, being racked into focus, must occupy the centre of field; or the centring screws must be applied until it does so.

Photomacrographs.—Amplifications of from one to less than ten diameters, which are suitable for many large objects and which I have named photomacrographs, are very readily made. If one has a microscope with wide body and the planar lenses of Zeiss or the special objectives of Leitz, he can proceed in the same manner as already described in making low-power photomicrographs. If he is unprovided with these facilities, he may utilize any camera with sufficient length of bellows and a good rectilinear lens of not too great focus. All he has to do is to arrange the apparatus so that the rays of diffused daylight pass through the object, if the latter be transparent, and that no other light shall enter the lens. Any one with the least ingenuity can manage this. By far the best way of doing it, however, is with a camera constructed like the Enlarging and Reducing one already described. With this form the illustrations (Figs. 33, 34, and 35) were made. The camera is arranged in front of a window having a northern exposure, if possible, and so inclined that the light reflected from sky alone may fall upon its front, in which the object is fitted, and so that no ray can enter the camera that does not pass through it. The lens is screwed to the inside partition through the door on side of the middle division. Enlargement to the desired degree and focussing are done by manipulating the two divisions, and the ground-glass screen is quite fine enough for the latter under the low amplifications; stop $f/_{22}$ will be found the most generally useful.

The accompanying photomicrographic illustrations have been selected from my collection of negatives, as covering a fairly wide range of subjects suited to the pages of this journal, together with a still greater variety of photographic manipulations in illumination, exposure, and development. They likewise serve to show that one is not limited in the choice of lenses, condensers, or sensitive plates for making good and acceptable work. Only three out of the whole number were specially made for reproduction herewith, the others were taken at different periods of my work,—ranging over a space of almost twenty years,—in order to encourage the beginner, as to what he may accomplish at the outset if only his heart be in his work. And since the making of these

negatives covers so considerable a ground, I have deemed it advisable to give a succinct, detailed statement of the processes followed in the making of each, hoping that the practical hints given may prove helpful to many a beginner.

Two plates, VI. and VII., containing fifteen photomicrographs, have been made by the *phototype* process, and the remainder of the illustrations are by the half-tone process. It may not be amiss to state here that letters E of Plate VI. and J, K, L, of Plate VII., together with Fig. 19 of Plate IX. were made with the " Handy" camera (previously described) a dozen years ago.

Aschoff and Gaylord illustrate their recent work on " Pathological Histology" with many most excellent photomicrographs, some of which are prepared by the three-color process. Many other works might be cited, but this volume shows well how effective this method is in illustrating medical books.

PLATE XVI.—Photomacrograph.

Fig. 35.—Subject, human foot and ankle (fœtal), longitudinal section. × 4½. Objective, Beck's seven-inch rapid landscape lens at f/22. Radiant, diffused daylight. Plate, Carbutt B. Exposure, three seconds. Developer, eiko-hydro powder. Enlarging, reducing, and copying camera.

Progress of Medicine

DURING THE YEAR 1900.

BY N. J. BLACKWOOD, M.D.,

Passed Assistant Surgeon, U.S.N.

Of the various important subjects deserving mention in a review of medicine during the closing year of the nineteenth century, none have aroused greater interest in the profession than the character and the effects of the wounds produced by modern firearms and the question of sanitation as applied to large bodies of men in the field.

The principle of inoculation against typhoid fever has been given in South Africa an exceptional opportunity for experimentation and investigation, the outcome of which cannot be definitely stated as yet, owing to the lack of published statistics. The mosquito origin of malaria has passed from the sphere of theory to that of fact, as the result of the careful experiments of Manson, Ross, Koch, Grassi, Celli, Bignami, and others, and of members of various commissions who so successfully lived for months in the most malarial region of the Roman Compagna without contracting the disease. The plague, owing to the fact of its introduction into ports of the British Isles and Australia, has been investigated with benefit and many new facts have been elicited. The Indian Plague Commission reports that inoculation by Haffkine's method decreases the number of persons attacked with the plague and lowers its death-rate. The study of yellow fever, including its serum treatment and its transmission by the mosquito, has received much attention.

Dukes's description of the " fourth disease," an affection differing from scarlet fever, measles, and German measles, has excited much interest. His exceptional opportunities for the study of children's diseases at Rugby lead him to believe (1) that, though

the resemblance of the fourth disease to scarlet fever is so close, both diseases occurred concurrently and some of the sufferers had both diseases in the same epidemic; (2) that nearly one-half of the patients had had rubella within a year or two before, so that, according to Cullen's established law, the presence of the latter disease was excluded.

The ever-interesting subject of when and how to operate for appendicitis has occupied much space in the medical literature of the world. The attention of surgeons has been largely directed to conditions and treatment of the alimentary tract. The practice of medullary narcosis, though first advocated many years ago, has taken on a new life as the result of more careful investigation and more extended trial.

A new treatment for the cure of aneurism has been given to the world, and many new drugs, such as aspirin, quinic acid, heroin, dionin, kryofin, and pyramidon, have been added to our already overburdened materia medica. Of the animal extracts but two have stood the test of time,—namely, thyroid extract and the extract of the suprarenal gland.

No particular advances seem to have been made in the sphere of obstetrics and gynæcology, but the attention of the members of this branch of medicine has been most occupied with a discussion of the various methods of operation, with a leaning towards more conservative treatment in various instances.

Bacteriology has been advancing along its usual careful and studied lines, and it now seems probable that we may definitely add the micro-organism of scarlet fever to our list of known causes of disease.

Neurologists are still occupied with the neuron theory and the investigations attendant upon its development, while the department of ophthalmology has discussed Mules's operation, color-blindness, lachrymal obstruction, treatment of entropion, etc.

Haldane and Smith find that the proportion of blood to the body-weight is 1 to 20.5, and not the usual 1 to 13 of the text-books.

In chemistry, radio-activity, the elements resembling argon, ureine, and quantitative estimation of glycogen are a few of the subjects which have attracted attention.

MEDICINE.

DIABETES MELLITUS.

DIETETIC TREATMENT OF DIABETES MELLITUS.—In the *Lancet* of May 19 appears an article by Dr. Robert Saundby on the subject of the modern treatment of diabetes mellitus. The writer arrives at the conclusion, "that under the influence of certain agencies the liver loses its power of storing glycogen; in consequence the tissues, gorged with sugar, suffer a diminution of their power to consume that substance; and, finally, glycosuria ensues, which becomes persistent and increasing unless arrested by treatment." As to treatment, Dr. Saundby points out that attention must be paid to the quantity as well as to the quality of the diet table, for it is more than probable that such untoward results as are alleged to have sometimes followed the strict diabetic diet were due to excessive quantities of albuminous food. The quantity of food that a patient should consume is calculated in heat-units. The generally accepted heat-values of the ordinary articles of diet are roughly as follows: for one gramme of albumin, four heat-units; for one gramme of carbohydrates, four units; for one gramme of fat, nine units; and for one gramme of alcohol, seven units. A person weighing one hundred and forty pounds requires daily, on slight work, an elementary value of two thousand four hundred heat-units. A diabetic subject must receive in addition a quantity of food equal in heat-units to the amount of unconsumed sugar which he secretes. On this basis tables are given indicating the quantity and nature of food substances which may be given to diabetic patients so as to fulfil the above requirements. Thus, six ounces of cooked meat equal two hundred and ten heat-units, two ounces of fat bacon five hundred and forty heat-units, two eggs one hundred and fifty heat-units, two ounces of cream one hundred and twenty heat-units, three ounces of butter, seven hundred and twenty heat-units, three ounces of cheese three hundred and fifty-one heat-units, six ounces of green vegetables, say fifty heat-units, nine ounces of Callard's brown loaf, biscuits, and sponge-cakes fifty heat-units, half a pint of bouillon no heat-units, one pint of tea no heat-units, half a pint of claret fifty heat-units, and two ounces of Scotch whiskey two hundred and ten heat-units, which, distributed through three meals, represent the required amount of heat-units for twenty-four

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hours. The amount of sugar passed by a patient should be estimated frequently, and the diet allowed in accordance with the results obtained. These necessary analyses may perhaps seem a stumbling-block, but by means of apparatus now manufactured the necessary operation may be successfully accomplished in a few minutes. Especially noteworthy are the extras that may be gradually added to the diet of a diabetic patient, the apportioning of them being strictly governed by the reports of the urinary analyses. The monotony of the *régime* may be considerably modified, much to the patient's satisfaction. In making these additions to the diet, each extra must be allowed separately, and no further change should be permitted until the result of consuming the new articles of food has been carefully tested by analysis of the urine. When a sufficiently varied diet has been reached, a strictly uncompromising attitude should be maintained as regards further concessions. Having thoroughly followed Dr. Saundby's arguments, and having cited the illustrative cases quoted by him, we believe that practitioners will find that they have acquired much valuable information as to the dietetic treatment of diabetes mellitus, the success of any such therapeutic measure being governed by the care and completeness with which it is applied. Of the newer sweetening agents, there are two which require special mention,—lævulose and crystallose. Lævulose was formerly a scientific curiosity, but can now be bought for several dollars a pound. Not over one and a half ounces of this preparation should be given in twenty-four hours, an advantage of this substance being its considerable bulk. Apples contain a large amount of lævulose. One ounce of pure crystalline crystallose will last a patient nearly a year, as it is five hundred and fifty times sweeter than sugar.

Recent analyses of gluten purchased in Philadelphia in the open market, and supposed to contain but eleven per cent. of starch, were found on analysis to be about one-half starch. A recent dinner given to two diabetic friends, one of whom had just learned that he must adopt a diabetic diet, consisted of the following: Blue points on the half-shell, celery, salted almonds, and pickles. Bouillon. Lobster *au gratin* made with gluten bread. Fillet of beef, fresh mushrooms, and fresh asparagus. Canvas-back ducks and Brussels-sprouts. Tomato salad, with cream dressing. Fresh strawberry ice-cream, sweetened with lævulose. Almond and cocoanut cakes. Oranges. Nuts. Coffee, with crystallose compressed tablets. Apollinaris water.

SODIUM SALICYLATE IN DIABETES.—Dr. Litten (*Therapie der Gegenwart*, 1899, No. 3; *Deutsche Aerzte-Zeitung*, September 15) prescribes a tablespoonful of a four-per-cent. solution to be taken every

two or three hours, and says that larger doses are quite unnecessary. He finds that under the salicylate treatment the proportion of sugar in the urine almost always sinks one or two degrees, but it is against a large number of the "nervous" complications that the drug is mainly useful. Especially brilliant, says Dr. Litten, is its action in allaying the itching of diabetics, and even in causing the subsidence of the weeping eczema that is apt to follow. Occasionally, however, preparations of tar prove efficient when the salicylate has failed. In neuralgic complications, such as sciatica, intercostal neuralgia, and zoster, the drug often proves highly efficient. The author dwells particularly on the virtues of sodium salicylate in decreasing the amount of urine secreted and abating the thirst, both of which symptoms he interprets as of nervous origin. This action of the salicylate, he says, is extraordinary in most cases. It will be seen that Dr. Litten does not allege that sodium salicylate is to be regarded as curative of so serious a disease as diabetes mellitus, but, if his experience with it as a palliative proves to be that of most physicians who employ it in the treatment of that disease, a decided advance will have been made in the effort to prolong the lives of diabetics and relieve them of much distress. (From abstract in *Dublin Journal of Medical Science,* January, 1900.)

THE TREATMENT OF DIABETIC COMA.—As knowledge of the dietetics of this disorder increases, the profession is learning that strict adherence to antidiabetic food favors the development of coma. While the exclusion of carbohydrates lessens the amount of sugar in the urine and thus overcomes one symptom of the disease, it is doubtful, says the *Medical Review,* if the majority of cases of diabetes are improved by the lessening of the sugar. Greater benefit is to be derived from lessening the carbohydrates than from their total exclusion. The presence of acetone in the urine should at once direct the attention of the physician to the possibility of the development of coma. Even when this is not determined chemically, the peculiar odor of new-mown hay in the breath or a marked lassitude of the patient should be sufficient to direct attention to this possibility. These symptoms should be followed by an abrupt change from an antidiabetic diet to a strict milk diet. Saline purgatives should be administered to clear out the intestinal tract, as it is possible that diabetic coma may arise from fermentations in the intestinal tube. Sodium bicarbonate should be administered in large doses, to overcome the lessened alkalinity of the blood. If coma develops, the following solution should be injected into the colon:

R Sodii chloridi, ʒi;
Sodii bicarbonatis, ʒiiss;
Aquæ dest., Oii.—M.

If this is not followed by some relief, the same solution, properly steril-
ized, should be given hypodermically, or in cases of great urgency it
may be thrown into the veins. (*Journal of the American Medical
Association,* December 16, 1899.)

THE PATHOLOGY OF DIABETIC COMA.—Dr. Grube discussed before
the Pathological Society of London the various theories which had been
advanced in explanation of the above condition, among others, that
of acetone poisoning, which has engaged so much attention. He ob-
served, however, in regard to this, that acetone was poisonous only in
very large doses, and that the symptoms resulting were not those of
diabetic coma. He had performed twelve experiments upon cats by
injecting intravenously beta-amidobutyric acid in aqueous solution.
Narcosis followed; the pupils first dilated, then contracted; the
respiratory movements became slow and shallow; the blood-pressure
was increased. In many cases sugar was present in the urine, but to
this fact the author attached no significance, as such a result arises in
cats from various operative procedures. Diacetic acid was present,
and in some acetone. He concluded that the substance with which he
had experimented is but one of those concerned in producing diabetic
coma. (*British Medical Journal,* March 10, 1900.)

PROGNOSIS OF GLYCOSURIA AND DIABETES.—From observations on
some two hundred and fifty cases of diabetes, Hirschfeld [1] expresses dis-
sent from the prevailing view with regard to the curability of this con-
dition. Of course, the interpretation of the presence of sugar in the
urine depends essentially upon whether it is to be looked upon as a
simple glycosuria or as a symptom of diabetes, and the prognosis must
necessarily vary accordingly. Hirschfeld attempted to determine in
how far prognostic conclusions could be reached from the severity of
the functional disturbance in the individual case. Nervous symptoms
or complications offer no indication as to the severity of the diabetes,
which can be ascertained only from the degree of glycosuria itself.
The improvement that follows the withdrawal of carbohydrates does
not appear until after the lapse of several months, although the assimila-
tive power is increased immediately. Long-standing cases, of course,
improve less commonly than those of more recent origin. In general,
it may be said that if in a chronic case such conditions cannot be estab-
lished,—that is, improvement in assimilative power,—in spite of restric-
tion of carbohydrates, permanent cure cannot be hoped for. Exacer-
bations are due principally to overloading the organism with an excess

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[1] Berliner klinische Wochenschrift, 1900, Nos. 25 and 26. Editorial, Medical
Record, August 25, 1900.

of carbohydrates. In addition to glycosuria there may be an increased elimination of acetone. In severe cases there is more acid in the urine. It is a debatable question whether diabetic coma is an acid intoxication. The patient may feel well, but coma is readily induced, as, for instance, by physical exertion or inanition. It is of general prognostic importance that acetonuria in contrast with glycosuria more frequently exhibits a tendency to spontaneous increase. Metabolic disturbance is to be taken into consideration,—namely, deficient absorption of the food. This in itself renders the prognosis unfavorable. In Hirschfeld's experience the majority of febrile diseases were without any influence on the glycosuria. To this rule, influenza constitutes an exception, causing in many cases an increase in glycosuria and coma. A directly deleterious effect is exerted also by those disorders considered peculiar to diabetes,—namely, furuncle, carbuncle, and gangrene. Psychic influences, particularly severe fright, have a bad effect upon diabetes, as have also painful affections, biliary calculi, renal calculi, and hypochondriacal delusions. Cardiac enfeeblement may be a manifestation of diabetes, and it will often disappear under the use of an antidiabetic diet. Increase in polyuria is sometimes indicative of aggravation of diabetic functional disturbance. Alcoholism is regarded as scarcely a factor in the etiology of diabetes. The essential point to be borne in mind is that in cases of diabetes glycosuria is a most variable symptom, with a tendency, especially in recent cases, to undergo spontaneous improvement unless the organism be deluged with carbohydrates. As to the recognition of alimentary glycosuria as a distinct variation, its brief duration and the lower percentage of sugar, as well as the absence of characteristic symptoms such as polyuria and nervous manifestations, can no longer be considered as decisive, while the evidence goes to show that its clinical course is identical with that of diabetes. In conclusion, Hirschfeld prefers to speak of a relative rather than an absolute recovery or cure, and this he considers accomplished when the patient tolerates two hundred grammes of carbohydrates daily without the appearance of sugar in the urine.

TYPHOID FEVER.

ANTITYPHOID INOCULATIONS.—This subject has had wide discussion and some rather extensive experimentation, but as yet it seems impossible to judge correctly of its value, because of the want of sufficiently complete statistics. The practice is much lauded by Dr. Conan Doyle and at the same time condemned by others of equally good opportunities of observation, but that the antityphoid inoculation would be a great blessing, especially to the soldier in the field who suffers most

from enteric fever, no one can deny. Even in countries where sanitation is more or less effective, there have been as yet no absolutely sure methods discovered for preventing this disease or staying its spread when it has once broken out among a large body of men. This fact has been clearly demonstrated in all three of the recent wars in which Europeans have engaged. Undoubtedly strict sanitation will do much towards preventing an outbreak and nipping an epidemic in the bud, but much yet remains to be learned concerning the etiology and the most effective way of fighting and controlling the disease. Although inoculation against typhoid fever has been practised in the British army in India for a few years, and although Professor Haffkine declares that it has been successful in reducing the mortality there to a very large extent, the statistics at hand are not sufficiently convincing altogether to substantiate this statement. Sir William MacCormac says, "No decided opinion can yet be given on this point, since there are no sufficient data for statistics. The observations made seem to show that those inoculated are less apt to take the disease, or if they are attacked they have it in a milder form, but the question is still *sub judice*."

The official statistics with regard to the results obtained in the beleaguered garrison at Ladysmith, as cited by A. E. Wright (*Lancet,* July 14, 1900, p. 95), show that among 10,529 non-inoculated individuals there occurred 1489 cases of typhoid fever—a proportion of 1: 7.07; with 329 deaths—a proportion of 1: 32 of the whole number, and of 1: 4.52 of the number of cases; while among 1705 inoculated individuals there were thirty-five cases of typhoid fever—1: 48.7; with eight deaths—1: 213 of the whole number, and 1: 4.4 of the number of cases. Most of the cases were inoculated but once. In but two cases inoculated twice did typhoid fever develop. It would thus seem that a second inoculation confers a considerable additional protection. It is also uncertain whether an antityphoid serum or a vaccine consisting of a sterilized typhoid culture was employed.

Conan Doyle, writing to the *British Medical Journal* of July 7, 1900, says, "The outbreak of enteric fever among the troops in South Africa was a calamity the magnitude of which had not been foreseen, and which even now is imperfectly appreciated. We naturally did not dwell too much upon it while the war was in progress, but it was appalling in its severity both in quantity and quality. I know of no instance of such an epidemic in modern warfare. I have not had access to any official figures, but I believe that in one month there were from ten thousand to twelve thousand men down with this most debilitating and lingering of continued fevers. I know that in one month six hundred men were laid in the Bloemfontein cemetery. A single

day in this one town saw forty deaths. There is one mistake we have made which will not, I think, be repeated in any subsequent campaign. Inoculation for enteric fever was not made compulsory. If it had been so, I believe that we should (and, what is more important, the army would) have escaped from most of its troubles. No doubt the matter will be fully threshed out in statistics, but our strong impression from our own experience is that, although it is by no means an absolute preventive, it certainly modifies the course of the disease very materially. We have had no death yet (*absit omen*) from among the inoculated, and more than once we have diagnosed the inoculation from the temperature chart before being informed of it. Of our own personnel, only one inoculated man has had it, and his case was certainly modified very favorably by the inoculation."

A correspondent of the *London Lancet* gives his views as follows, as opposed to those of Dr. Conan Doyle: " At present it is perhaps too early to condemn inoculation against typhoid fever. It certainly does not prevent a person from contracting the disease, and it seems doubtful whether the inoculated person will show any greater immunity than the non-inoculated person. Slight attacks have occurred in both classes of patients, and two in this hospital have succumbed to the disease. On *a priori* grounds one would hardly expect that a preventive serum treatment would be successful in a disease which after its existence for something like three weeks cannot protect a person from a relapse. Moreover, second attacks are by no means unknown, and one patient had a most severe second attack of typhoid fever from which he died, so that a previous attack does not seem to protect from the disease or to lessen its severity."

In the *British Medical Journal* of January 20, 1900, will be found some remarks by Dr. White and Dr. Leishman on the results which have been obtained by the antityphoid inoculations. The comparison of the disease statistics among the inoculated and the uninoculated is remarkable enough, but much more so when one takes into account the unfavorable conditions under which the inoculations were performed. The work was undertaken by the authors when serving with the Indian Plague Commission, so that it could only be irregularly prosecuted while *en route* from place to place. Moreover, as sufficient vaccine material could not be taken out from England, that employed had to be prepared and standardized under the most unfavorable conditions. Even with these statistics, which beyond question would be vastly improved under favorable conditions, we find a reduction of cases from 2.5 to 0.9 per cent., and a diminution of mortality from 0.35 to 0.2 per cent. It appears that the annual average of cases of typhoid fever

in the British army in India is eighteen hundred, and the number of deaths four hundred and sixty, so that applying the statistics to these numbers there would be an annual saving of over one thousand cases of enteric fever and of nearly two hundred lives. In most of the cases the inoculated men were young soldiers who had recently arrived in the country, and therefore were in a condition of maximum susceptibility, while the uninoculated were the more seasoned older soldiers of less susceptibility. In some cases, too, the inoculation took place in the presence of an epidemic, and, as could be demonstrated now and again, in patients during the incubative stages of the disease. The difficulty in getting a wider application of antityphoid inoculation lies in the patients themselves. (From abstract in *Therapeutic Gazette,* March 15, 1900.)

SOLID FOODS IN TYPHOID FEVER.—Notwithstanding the fact that for years we have pursued the same even tenor in regard to diet in typhoid fever, considerable discussion has recently occurred as to whether, after all, we have been doing the proper thing. In 1897 Dr. A. G. Barrs made a plea for a less restricted diet in this disease, which was followed very closely by an elaborate report by Dr. F. C. Shattuck, of Boston, on the use of solid foods in typhoid fever. A recent address by Dr. R. H. Fitz, of Boston, and a paper by Morris Manges, of New York, and one by R. W. Marsden, of the Monsall Fever Hospital, England, on the same subject were published last year. Dr. Marsden records the results obtained in two hundred cases of typhoid fever. Until well into the last century fever, while looked upon as an entity, was regarded as due to general or topical inflammation, and its treatment consisted in a rigorous system of depletion, one of the factors in which was a low diet or even a total abstinence from food. The first advance was made by Dr. Graves, who wrote, " I am convinced that the starving system has in many instances been carried to great excess, and that many persons have fallen victims to prolonged abstinence in fever." His diet for fevers—typhoid and typhus fever not yet being differentiated—was well-boiled gruel, toasted bread, and thin animal jelly or broth. Graves was followed by Trousseau, and he apparently instituted the present method, for he says, " Care must be taken not to fall into the opposite extreme of those who are not allowed to begin solid food at the beginning and in the course of continued fevers." Murchison has set a time limit on the exhibition of solid foods when he says, " Meat ought not to be allowed for at least seven days after the cessation of pyrexia." Dr. Barrs has pointed out that there are no exact observations to show that "solid food *per se* is bad and liquid food *per se* is good in febrile states." The continuance of a restricted diet

in typhoid fever must stand or fall upon the verification or refutation of the statements made since the time of Trousseau, that too early a recourse to solid food is likely to entail harmful consequences, for if this were true, all would admit that it is absolutely necessary to resist the patients' demands for food when, as is usually the case, they have a craving appetite.

In Dr. Marsden's two hundred cases all patients received milk only at first, and passed through the usual stages with greater or less rapidity according to their condition. The patient in a mild case without contraindications would receive, on successive days, bread and milk, custard, fish with mashed potatoes, chicken, bread and butter, and finally minced meat, remaining until convalescence was well established; whereas in a severe case peptonized milk alone, or with the addition of meat juice, etc., might have to be continued well into the period of convalescence. He practically agrees with Dr. Barrs that the patient's wishes constitute a most important indication, and thinks that his cravings are an almost infallible guide. On no occasion has solid food been forced upon a patient. He then discusses the various injurious consequences of a too early administration of solid food which had been advanced, under the following headings: (a) Diarrhœa. (b) Hemorrhage. (c) Perforation. (d) Pyrexia. (e) Relapses.

As to the first he concludes that careful diet, with solids at an early stage, does not produce diarrhœa or give evidence of acting as an irritant to the intestinal mucous membrane.

Under the second, *hemorrhage,* he believes that this could occur only as a result of direct irritation, but that the most copious hemorrhages are met with chiefly in the worst attacks, with much diarrhœa, and that in these cases it is not likely that solid food had been eaten.

In his two hundred cases there was not a single instance of *perforation,* yet this complication was more than usually prevalent during the period in which they occurred.

Under *pyrexia* he states that in one hundred and eighty out of the two hundred cases there was not the faintest proof of a rise in the temperature, in eleven cases a temporary exacerbation occurred afterwards, in two cases there was an increase in the morning and evening oscillations, whilst the remaining seven cases were connected with relapses. Considering the surprising variations which are always apt to occur in typhoid fever, he does not believe it can be shown that the food in any of the cases caused this pyrexia. Relapse or recrudescence occurred in forty-eight of his two hundred cases. Of these, in twelve instances it was intercurrent, in nine it was spurious, and in the re-

maining twenty-seven it was true, thus giving a percentage of 13.5, which is by no means excessive. In a review of these two hundred cases, it must be concluded, he thinks, that a careful system of dieting has no injurious consequences as compared with its benefits,—namely, more rapid recovery, diminished risk of surreptitious feeding with harmful substances, less disposition to bolt food, when allowed, without proper mastication, and, finally, lessened tendency towards asthenic complications, as post-typhoid anæmia, gangrene, etc. It must be admitted that there is no justification for entirely resisting a craving appetite in the manner at present in vogue.

According to Dr. Barr's report of observations, he fed patients with bread and butter, minced meat, and ordinary mixed diet, even with the temperature at 104° F., and claims that they were benefited thereby. His observations were based on thirty-one cases, of which only three ended fatally, and all three of these patients had been unable to take solid food.

Much more striking than any of these results are those reported by Bushuyev, a Russian. In order to demonstrate the desirability of feeding typhoid patients, he, in 1896-7, arranged a series of comparative cases, one division of which received only milk and one or two soft-boiled eggs, or only Stokes's mixture, while in the other series full diet was given, according to the following table:

7.00 A.M.—Tea with a roll.

8.00 A.M.—Four hundred cubic centimetres of soft or liquid oatmeal, barley, or white porridge, with butter.

9.00 A.M.—One or two boiled eggs, either soft or hard, as the patient desires.

10.00 to 11.00 A.M.—A glass (from two hundred to two hundred and twenty cubic centimetres) of milk with a roll, half a cutlet, and a bit of boiled meat (one hundred and sixty grammes).

12.00 to 12.30 P.M.—A plate (two hundred and twenty cubic centimetres) of chicken soup or a bowl of ordinary soup, sometimes with a bit of chicken from the soup, and a small cup of kisel (a sort of sour jelly), a roll, and a little preserved fruit.

8.00 P.M.—Tea with a roll.

6.00 P.M.—A cup of chicken or beef soup, semolina pudding, or milk and a bit of chicken.

8.00 P.M..—Milk with a roll.

During the night, coffee or tea with milk, two or four times, or coffee with cognac.

For dinner or supper the white bread may be replaced by black, without the crust, and the soup by a thick white gruel. Many patients prefer boiled meat to cutlets, and the ordinary soldier's soup to hospital soup and gruel. The milk is generally boiled; occasionally it is given in the form of junket. As a beverage the patients were allowed

cold water, boiled or unboiled, cranberry-juice, milk of almonds, small amounts of beer, and kava. The cranberry-juice was particularly grateful to the patients. In addition the patients received from one to three ounces of wine in the morning, and every two hours one-half ounce of Stokes's mixture. The results of these two plans of treatment were as follows:

	Bushuyev.	Sartslevich.
Whole number of patients	80	74
Recovered	72 (90 per cent.)	65 (87.8 per cent.)
Average day of illness on entrance in the hospital	7.5	5.8
Average day of entrance to division	8.4	8.3
Day on which recovery was complete . . .	49.5	55
Number of days spent in hospital	42	49.2
Days of fever in hospital	18.9	22.8
Dismissed incapable of duty	6 (8.3 per cent.)	10 (15.4 per cent.)
Died	8 (10 per cent.)	9 (12.1 per cent.)
Average day entrance to hospital	8.5	5.8
Average day of entrance to division . . .	9.1	8.4
Day of death (average)	28.6	26.7
Number of days between entry and death .	20.1	19.4

Bushuyev declared that those who objected to feeding based their objections not so much on the insufficiency of the digestive juices as on the danger of hemorrhage. He argued that the changes of resulting perforation rarely came on suddenly; they come on slowly; furthermore, that the lesions are so far removed from the stomach that by the time the foods (even those difficult to digest) reach those areas they are so far changed that they would not be likely to injure the intestines. Wholly indigestible substances, such as hard seeds or skins, which might injure the gut, are, as a rule, so rolled up in mucus or intestinal contents as to be harmless. Autopsies on patients dying of typhoid fever on the third day or later, who had been liberally fed, showed that the intestines were in the same condition as those of patients who had received ordinary typhoid fever diet. That the cause of perforation is not the character of the food or the nature of the ulcer is asserted, since one never hears of perforation of a tuberculous ulcer being due to food. He also states that he knows of nothing to support the view, held by some, that injury to the intestinal walls by solid foods might provoke a re-entrance of the bacilli and increase the frequency of relapse. During the year 1897, under this diet he lost twenty-six out of three hundred and eighteen patients, or 8.2 per cent. Prior to that the mortality had been from 10 to 19.3 per cent. at the military hospital at Kive. The tongue and lips remain in relatively good condition under this diet.

There are no unpleasant gastric or intestinal symptoms: the bowels are often constipated and pea-soup stools occur only in cases fed with milk and bouillon. As to complications, it is to be noted that intestinal hemorrhage was not more frequent under solid diet than under exclusive liquid, and he had not lost a single case from intestinal hemorrhage. The loss of weight in these patients was less than that which occurred in those given a more restricted diet. The general condition was so good that they preferred, as a rule, to walk to their tubs and to the closet.

Dr. F. C. Shattuck, of Boston, follows the same line of argument as Bushuyev, and his results are equally striking. Shattuck, after arguing against the old methods of depletion in acute febrile diseases, says that, though typhoid fever is a self-limited disease, yet, inasmuch as we cannot directly attack the cause, its long duration renders it necessary to support the patient's strength to the utmost by maintaining nutrition at the highest level. We have no fear of feeding febrile patients in other diseases, and he calls attention to the forced feeding in the suppurative fevers, whether tuberculous or not. Furthermore, he says that, no matter how we feed a patient, there will be inevitable peristalsis, and the waste products must pass over the ulcerated areas. He does not believe that relapses are due to dietetic errors alone, nor that these factors can cause fresh infection by bacilli. His diet includes (1) milk, hot or cold, with or without salt, diluted with lime-water, soda-water, Apollinaris or Vichy water, peptogenic and peptonized milk, cream and whey, milk with white of egg, koumiss, matzoon, whey, milk with tea, coffee, or cocoa. (2) Soups,—beef, chicken, tomato, potato, oyster, mutton, pea, bean, squash,—carefully strained and thickened with rice, powdered arrowroot, flour, milk or cream, egg, and barley. (3) Mellin's food, malted milk, carni-peptone, bovinine, somatose. (4) Beef juice. (5) Gruels,—corn-meal, crackers, flour, barley-water, toast-water, albumen-water with lemon-juice. (6) Ice-cream. (7) Eggs,—soft-boiled, raw, eggnog. (8) Finally, minced lean meat, scraped beef, soft bread or roll, oysters, soft crackers with milk or broth, soft puddings without raisins, soft toast without crust, blanc-mange, wine jelly, macaroni.

Dr. R. H. Fitz, of Boston, presented to the New York State Medical Association the statistics of typhoid fever at the Massachusetts State hospital from 1881 to 1899. For the thirty years between 1839 and 1869 the diet of typhoid patients was liquid or semi-liquid, even containing some farinaceous ingredients. From 1869 to 1879 beef tea and beef juice were largely given in addition to milk. From 1879 to 1899 the liquid portion of the diet has been chiefly milk. Between 1893

and 1898 the patients under the care of Dr. Shattuck have received, in addition to the milk, minced meat, soft-boiled eggs, macaroni, soft crackers, toast, and puddings. During the thirty years of liquid farinaceous diet, the average mortality was 14.1 per cent. In the milk and beef tea decade it was 16.6 per cent., although in the immediately preceding milk and farinaceous decade it was 15.9 per cent. From 1879 to 1899, among those patients using milk as a principal article of food the mortality was 14.6 per cent. The mortality was only 11.3, however, among the patients who between 1893 and 1898 were fed upon the liquid and soft solid diet prescribed by Dr. Shattuck. Hemorrhage was noticed among patients living upon a milk diet in 10.6 per cent., among those fed on broth and amylaceous fluids it was 16 per cent., while among those living upon fluids and soft solids it was only 9 per cent. The inference from this comparison is that a diet of soft solids not only does not provoke intestinal hemorrhage, but that it lessens the tendency to this complication. Relapses were rather more frequent in patients living largely upon a milk diet, the ratio among them being 13.1; it was 11.1 per cent. among patients living on strained proteid and amylaceous diet and 10.2 among patients fed upon fluids and soft solids.

The fundamental principle is that typhoid fever is a general infectious disease, the first and most important feature of which consists of lesions in the intestines, and, since these lesions are accompanied by an ulceration, more or less deep, of the intestinal walls, every effort should be made to secure the utmost possible rest for the gut, both in the nature of the food residue which passes through the involved intestine and in the amount of distention to which its walls may be subjected by undue fermentations. Another important fact which must not be overlooked is this, that the severity of the intestinal lesion cannot be inferred from the amount of diarrhœa. The deepest ulceration may be accompanied by constipation, and, furthermore, a marked catarrhal condition of the mucous membrane with only mild ulceration of Peyer's patches may be accompanied by an unusual number of intestinal evacuations. Finally, it is by no means proved that administration of solids naturally increases diarrhœa or tympanites: the contrary is often true. The point upon which special stress must be laid is that typhoid fever is a general toxæmia, and it is to this condition rather than to any particular lesion that we must direct our attention in regulating the diet.

Barrs has contended that ulceration in the intestine is like ulceration elsewhere, and will heal much more rapidly when the blood and tissues are well nourished. The disease being one of long duration, the

patient is enabled to combat it far better if his general nutrition has been kept at the highest point possible under the circumstances. That this plan is feasible is shown by the results narrated by Barrs, Shattuck, Fitz, and Bushuyev.

Qualdi finds a close connection between the prevalence of typhoid fever and the consumption of raw vegetables, upon which Ceresole has found the typhoid bacillus.

OPERATION FOR TYPHOID PERFORATION.—Taylor (*Annals of Gynæcology and Pediatry,* January, 1900) reports five cases of typhoid perforation. The first was operated upon after sharp abdominal pains, rigors, and vomiting, suggesting perforation; death occurred in six or eight hours. The second case was operated on the fourth day after the accident; death ensued in eight or ten hours. The third patient was operated on twelve hours from the time symptoms suggested perforation, and recovered. The fourth patient was operated on four hours from the onset of symptoms, and died in about nine hours. The fifth patient was operated on twenty-four hours from the onset of symptoms, and died on the table. In at least one of these cases the early symptoms of perforation were extremely obscure. The author states that less than two hundred in all have been operated on, with still a very heavy mortality; but that nothing short of a moribund condition should warrant us in abandoning the case as hopeless. The key to success is an early operation. (*Therapeutic Gazette,* April 15, 1900.)

MALARIA AND MOSQUITOES.

In our article on this subject in the April number of the INTERNATIONAL CLINICS of last year, we gave a *résumé* of the experiments and observations made by the various persons interested in this subject throughout the world, and fully elucidated the subject as far as it had progressed at that time. There is now but little to add except a brief account of further experiments and the facts thereby elicited which afford more substantial proof of the truth of the malaria-mosquito theory.

HOW TO LIVE IN MALARIAL DISTRICTS.—At the beginning of the malarial season, the London School of Tropical Medicine sent two of their members, Drs. Sambon and Low, to the Roman Campagna, there to test the possibility of guarding against malarial infection. After rejecting various other localities as for one reason or another unsuitable, they selected a spot about two miles distant from Ostia. The site of their hut was on the edge of a swamp forming part of the royal demesne of Castle Fusano, left unused in order to preserve the wild

boar, water-fowl, etc., which frequent it. The hut was placed close to a canal containing a luxuriant growth of algæ and other aquatic plants, and within a stone's throw of a clump of pine trees which forms the outskirts of the Campagna pine forests. The few dwellings near are inhabited by persons who constantly suffer from malaria, and are infested by mosquitoes of the anopheles variety. Situated thus, in the heart of the swamps surrounding the mouth of a large river, among the haunts of innumerable mosquitoes of the malarial variety, and in a locality notorious as one of the most deadly of the fever-stricken centres of the Roman Campagna, this dread and unhealthy spot appeared to offer the ideal conditions for carrying out the interesting but dangerous experiments which they had undertaken. Their only protection against mosquito-bites and fever was the use of wire screens in the doors and windows, and, by way of extra precaution, mosquito-nets around their beds. Not a grain of quinine was taken. Drs. Sambon and Low, Signor Terzi, and their two Italian servants entered on residence in this hut early in July. They went about the country quite freely during the day, but were careful to be indoors from sunset to sunrise. During the course of these experiments the whole party enjoyed perfect health, in marked contrast to their neighbors, all of whom were either ill with fever or had suffered from malarial attacks. These gentlemen expressed themselves as satisfied that protection from mosquito-bite protects from malaria, and that protection from mosquito-bite is perfectly compatible with active outdoor occupation during the day.

These experiments, together with the work of Ross, Grassi, Celli, Bignami, Bastianelli, and other Italians, and the recent observations on native malaria by Koch and the representatives of the malarial commission of the royal Society and Colonial office, plainly indicate that the practical solution of the malarial problem lies (1) in avoiding the neighborhood of native houses, which are the perennial source of malarial parasites; (2) in the destruction, so far as practicable, of the breeding pools of anopheles, and, principally (3) in protection from mosquito-bite.

The London School of Tropical Medicine has recently published a book entitled " Instructions for the Prevention of Malarial Fever, for the use of Residents in Malarious Places." This is made the text of an able article in the London *Times,* which concludes as follows: " All speculations about air, about soil, about malarial belts, and the like have been rendered obsolete, and there is no reason to believe that the parasite of malaria finds access to the human body through any other channel than by means of the anopheles mosquito, or that gnats and

mosquitoes which infest regions free from malaria are examples of anopheles. If this particular insect could be extirpated, there is every justification for the hope that malarious fevers would disappear from the earth. Fortunately, the extirpation does not seem likely to present any unsurmountable difficulty. The eggs are laid in water, and the larvæ, when hatched, live in water for about a week before they assume the mosquito form. As the larvæ rise to the surface to breathe, a film of oil on the surface is speedily fatal to them, by blocking up their air-spiracles. The fully formed mosquito lives for many weeks, but does not travel far, and probably obtains its food within easy reach of its native pool of water, to which it periodically returns for the purpose of depositing its eggs. Much may be done, therefore, by drying up the pools in the vicinity of houses, or by treating them once a week with a film of kerosene oil. Much may be done, also, by killing the mature insect when resting upon a wall after its meal, and it is to be noted that the true anopheles rests with its body almost at right angles to the surface of the wall, while the perfectly harmless gnat rests with its body parallel to the wall, or even somewhat inclined towards it." (?)

MANSON'S PROOF OF THE MOSQUITO ORIGIN OF MALARIA.—Dr. Patrick Manson, realizing the endless objections that are always the outcome of an imperfect acquaintance with any subject, and the disinclination of the world in general to admit that a pathological puzzle of so many centuries' standing could receive so simple an explanation as that afforded by the mosquito-malaria theory, cast about him for a means of proving the theory which would most graphically affect the minds of those in doubt. It occurred to him, therefore, that, if he repeated Grassi and Bignami's experiments in a more dramatic and crucial manner, that if he fed laboratory reared mosquitoes on a malarial patient in a distant country, and subsequently carried the mosquitoes to the centre of London and there set them to bite some healthy individual free from any suspicion of being malarial, and if this individual within a short period of being bitten developed malarial fever and showed in his blood the characteristic parasite,—the conclusion that malaria is conveyed by the mosquito could not possibly be avoided. In order to carry out this experiment, he had infected mosquitoes sent to London, and Mr. P. Thurburn Manson presented himself as a subject for the experiment. This experiment, with its results, is best described in the report of the case by himself.

" Dr. Bigami and Dr. Bastianelli very kindly undertook to send me relays of infected mosquitoes from Rome. I have to thank these gentlemen for the very great care exercised in this somewhat responsible matter. Every case of malaria coming to a general hospital is not

suitable for experiment. To have sent mosquitoes infected with malignant tertian parasites might have endangered the life of the subject of the experiment; and quartan-infected insects might have conferred a type of disease which, though not endangering life, is extremely difficult to eradicate. The cases, therefore, on which the experimental insects were fed had to be examples of pure benign tertian,—a type of case not readily met with in Rome during the height of the malarial season,—and the absolute purity of the infection could be ascertained only by repeated and careful microscopic examination of the blood of the patients.

" When the insects had fed, Dr. L. Sambon, who had gone to Rome, placed them in small cylindrical cages made of mosquito-netting stretched on a wire frame. Four such cylinders were packed in a well ventilated box and forwarded to the London School of Tropical Medicine through the British Embassy in Rome. By the courtesy of the Postmaster-General, they came forward by the Indian Mail, so that they arrived in London some forty-eight hours after leaving Rome. A good many of the mosquitoes died on the journey or soon after arrival, but a fair proportion survived and appeared to be healthy and vigorous. We are indebted to Dr. Sambon for the method employed of caging mosquitoes. Future experimenters will find it useful. To infect the insect, or to become infected by them, the experimenter has merely to place his hand in the cage after carefully untying the netting at one end, or, better, by laying the closed cage on his damped hand."

The following notes regarding this experiment are by Mr. P. Thurburn Manson, Guy's Hospital:

" I am twenty-three years of age. I was born in China, but have lived in this country since I was three years old, and have never been abroad since, nor in any district in this country reputed to be malarial. I am healthy.

" The first consignment of mosquitoes arrived at the London School of Tropical Medicine on July 5. Only some half-dozen had survived the journey. They were in a languid condition and would not feed satisfactorily. One may have bitten me. By July 7 they were all dead. The second consignment arrived on August 29. They had been infected in Rome on August 17, 20, and 23, by being fed upon a patient with a double benign tertian infection. The patient was reported to have had numerous parasites, including many gametes, in his blood. On arrival twelve insects were lively and healthy looking. I fed five of them on August 29, three on August 31, one on September 2, and one on September 4. They bit my fingers and hands readily. The bites were followed by a considerable amount of irritation, which persisted

for two days. The third consignment arrived on September 10. They had been fed in Rome on September 6 and 7 on a patient suffering from a simple tertian infection, but with very few parasites in his blood. There were some fifty or sixty mosquitoes in good condition. Twenty-five bit me on September 10 and ten on September 12.

"Up till September 13 I had been perfectly well. On the morning of the 13th I rose feeling languid and out of sorts, with a temperature of 99° F. By midday I was feeling chilly and inclined to yawn. At 4.30 P.M. I went to bed with severe headache, a sensation of chilliness, lassitude, pains in the back and bones, and a temperature of 101.4°. Repeated examinations failed to discover any malarial parasites in my blood.

FIG. 1.

DAY OF MONTH	Sept. 13th		Sept. 14th		Sept. 15th		Sept. 16th		Sept. 17th		Sept. 18th		Sept. 19th	
DAY OF DISEASE	1		2		3		4		5		6		7	
HOURS OF DAY	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.	A. M.	P. M.
F. 101°	9	4 10	2 6 9	1 5 7	12 3 7	1 5 9	8 12 6	7 10 8 10	2 6 8	6 10	2 6 10	6 10	2 6 10

"September 14.—I slept fairly well, but woke at 3 A.M. with slight sweating and a temperature of 101°. During the day my temperature ranged between 101° and 102°. The symptoms of the 13th were exaggerated and anorexia was complete. Several examinations of the blood were made again with negative result. To relieve headache ten grains of phenacetine were given at 6 P.M.; I perspired profusely but slept indifferently.

"September 15.—I woke at 7 A.M., feeling distinctly better, with a temperature of 100.4°. No malaria parasites were discovered on repeated examinations of my blood by my father. About 2 P.M. I com-

menced to feel slightly chilly; this soon wore off and I became hot and restless. By 4.30 P.M. my temperature was 103.6°. It remained about 103° till 9 P.M., when profuse sweating set in. I am told there was some delirium.

"*September* 16.—I woke at 8 A.M., feeling quite well; my temperature was 98.4°. I made several blood examinations and found one doubtful half-grown tertian parasite. In the afternoon and evening there was a recurrence of fever (temperature 102.8°), relieved by sweating.

"*September* 17.—I again felt quite well on waking after a good night's sleep; my temperature was 99°. At 10 A.M. several half-grown parasites, a gamete, and two pigmented leucocytes were discovered in the first blood-film examined. During the day many parasites were found. Their presence was verified by my father and by Dr. Frederick Taylor, Lieutenant-Colonel Oswald Baker, I.M.S., Dr. Galloway, Mr. Watson Cheyne, F.R.S., and Mr. James Cantlie, some of whom saw the films prepared. About 2 P.M. the sensation of chilliness returned (temperature 101.8°). By 5 P.M. the temperature had reached 103°. There was then copious sweating. The edge of the spleen could be felt on deep inspiration and there was a slight feeling of discomfort in the region of that organ. Dr. Frederick Taylor and Mr. Watson Cheyne confirmed the presence of splenic enlargement. By 9 P.M. the temperature had fallen to 99.2° and I was feeling better. Quinine (ten grains) was taken.

"*September* 18.—I woke after a good night, feeling perfectly well (temperature 97°). Ten grains of quinine were taken and subsequently five grains every eight hours. I continued perfectly well all day. A few three-quarter grown tertian parasites and some gametes were found during the forenoon and afternoon; they were seen by Dr. Oswald Browne, by my father, and by myself. At 10 P.M. the parasites had disappeared, the last being found at 5 P.M.

"*September* 19.—No parasites were discovered. The temperature is normal. I am feeling quite well. There is no splenic enlargement and no tenderness. Appetite has returned.

"*September* 25.—In good health. No recurrence of malarial symptoms."

The excellent clinical lecture of Professor Grassi in the January, 1901, CLINICS should also be referred to by those interested in this subject.

SERUM TREATMENT OF MALARIA.—Kuhn, chief medical officer to the Southwest African field force, says that he has succeeded in curing malaria by injections of serum obtained from horses which have con-

tracted the so-called "sterbe" disease. After the injection slight fever of a more continued character generally appears, but no local reaction takes place, and the malaria is changed from a chronic relapsing disease to an acute one, curable in from two to six weeks; immunity is also obtained. Fifty natives immunized by Kuhn in 1899 did not take the disease in the malarial season of that year; numerous others who had not been immunized fell ill but were cured by the injection.

PLAGUE.

In 1899 the plague prevailed throughout India and as far west as Alexandria and Oporto. In 1900 it continued its spread westward and also eastward, and appeared in isolated spots almost all over the world. The principal epidemics outside of Asia have been in Glasgow, Honolulu, Australia, and South Africa. The plague has now existed in India for five years, and has destroyed over two hundred and fifty thousand lives, and shows not the slightest tendency to abate.

The apparent immunity to plague of Europeans in India is responsible for a very comforting impression that plague is a disease of Asiatics. The occurrence of plague in Oporto tended to shake this belief; but the decline of the epidemic there without attaining any great size, notwithstanding the unsanitary condition of the port, once more strengthened the hypothesis, which, however, was finally disproved by the outbreak of plague in Sydney. Although this city possessed a well-organized sanitary department and notwithstanding the active and watchful care of the medical staff, the disease gained an entrance and a lodgement. As elsewhere, the mode of importation of plague into Sydney has not been traced, and, in spite of the most vigorous measures in the way of inspection and other port arrangements, in spite of the recognition of early cases and their removal to the hospital, and in spite of the crusade against rats, many hundred persons were attacked with the disease and a large percentage of deaths resulted. While the danger of a wide extension of the disease in a city like Sydney is comparatively slight, the risk of its dissemination from such a central point is always very great. The experience there is not calculated to inspire confidence as to the invulnerability to plague of the European towns or the sufficiency of methods now in vogue to meet an epidemic. A great deal has been learned about the source and character of plague since the discovery of the specific bacillus, by Kitasato, in 1894; but there is still much to be learned about the protective measures now practised, to make them wholly effective. The recent outbreak of plague in Glasgow is instructive in several ways. The first fact that we are met with in the history of the outbreak is that the original cases of imported plague

are not to be traced. The earliest known cases occurred among Glasgow people, whose relations, if any, with persons or articles newly come from foreign countries cannot be determined, the enemy slipping by the outposts of the sanitary department without even being suspected. The next fact is that as soon as the presence of plague was established, the whole forces of resistance at the disposal of the municipality of a great city, with one of the best public health departments in Great Britain, that at once brought into action all the various procedures of prompt hospital isolation, house-to-house visitation, observations of contacts, etc., were employed without stamping out the disease, or at first apparently even lessening its spread.

The circumstances of the outbreaks in Glasgow and Sydney direct our attention to certain points as regards the spread of plague. However the arrangements made by port sanitary authorities and however watchful for cases of imported plague the board of medical officers may be, it is almost certain, from the nature of the disease, that cases will from time to time escape their vigilance. It is essential, therefore, that all sanitary authorities should be prepared for the appearance of cases of plague in their districts, whether brought from over the sea or by persons or articles coming from infected places. Plague is a preventable disease, and does not, like cholera and typhoid fever, become suddenly and widely epidemic through pollution of water-supplies. Its infection is clearly not capable of being carried considerable distances aërially, as is influenza, and possibly measles. Typhus fever more closely resembles plague as regards its method of spread.

The rat is acknowledged to be a chief factor in the dissemination of the disease, as this animal is peculiarly liable to infection through the alimentary canal, and is notoriously migratory in its habits. Dr. Jose Verdes Montenegro, of Madrid, asserts that the plague is simply a disease of rats which infects man. According to the observation of Simon, the epidemic among rats follows a course analogous to that in man. After a period during which the cases are not very frequent, the plague becomes suddenly very severe, with a consequently increased mortality. Thus it happens that before the disease attacks man large numbers of rats are found in the houses and streets of a threatened district. This was the case in Mondvi, where the street Arabs amused themselves by using the dead animals as missiles in play.

Much has been written lately in support of the theory that a human being may become infected with the plague through the agency of fleas which have infested rats, but satisfactory proof on this point is still lacking. It has been demonstrated that fleas taken from a plague-stricken rat are capable of inoculating healthy rats and mice with the

plague bacilli, but it must be borne in mind that there is a distinct difference between the flea of man and that which infests rats and mice. These fleas are distinguished as follows. The flea of man, *Pulex irritans,* has a fat, reddish-brown body and is without a comb on the head or prothorax. The flea most usually found on rats, the *Typholopsylla musculi,* has a thin body, is yellowish in color, with spines upon each side of the inferior border of the head, and a comb upon the prothorax. Upon the mouse and marmot we find also the *Pulex pasciatus,* but it presents upon the prothorax a comb of eighteen points, and has been seen only in Holland, Halle, and once in Milan. Simon says that a healthy rat has very few fleas on it, but the sick animal becomes very soon covered with them; the insects become gorged with bacilli, and transfer the disease not only from one rat to another, but also to man.

Whether or not the plague is contagious or infectious, whether or not it depends upon soil or house contamination, we know only one thing,—that an epidemic, when once started, burns like a destroying fire madly reaching for available fuel. If we confine ourselves to the study of isolated cases, the conclusion seems almost irresistible that the real danger of directly communicating the disease from person to person is very much exaggerated. It is probably, however, markedly infectious under certain circumstances of careless contact, as shown by recent experiences in the Vienna laboratory and in the case of two of Kitasato's assistants, who acquired plague by coming in contact with the blood and secretions of autopsy cases. Physicians, nurses, and undertakers who come in contact with plague cases seem remarkably free from the contagion, and are seldom stricken when proper aseptic precautions are taken.

The plague in Honolulu is believed to have been arrested by the extensive fire in the oriental quarter. The work of inspection was most thorough. The Sanitary Committee divided Honolulu into forty inspection districts, with a voluntary inspector in charge of each. Each district was divided into sections containing from seventy-five to one hundred and fifty inhabitants, and a voluntary sub-inspector was placed over each of these. Each sub-inspector went over his section twice a day, and personally saw each inhabitant, reporting every case of illness, however trivial, to the board of health, which sent a physician at once, and, if any plague symptoms were discovered, the patient was isolated, and all who had come in contact with the premises were quarantined.

In Manila the disease gained great headway. This is said to be the first visitation of plague that the city has ever had. It was undoubtedly brought from Hong Kong, where during 1899 there were fourteen hundred and eighty-six cases, with fourteen hundred and twenty-

eight deaths. In the larger cities of India the conditions have been growing worse, owing to the influx of famine sufferers, who present a fertile soil for disease of any kind. In Egypt there has been a recrudescence of the disease. It has reached New Caledonia, and since the middle of March there has been an epidemic in Buenos Ayres. It has made its appearance on shipboard off Cape Town, and one or two cases were reported in San Francisco.

The difficulty in making an early differential diagnosis between plague and so many other diseases with similar symptoms has been one of the great drawbacks in the prompt isolation and treatment of so-called sporadic cases.

ANTIPLAGUE INOCULATION.—The conclusions in regard to the prophylactic use of Haffkine's antiplague inoculation naturally group themselves into those concerned in the protective effect of the injection, and those concerned with the adoption of the inoculation as a measure against the ravages of the plague upon individuals and communities.

No specific has yet been discovered for the treatment of plague, and ordinary curative measures have but little effect upon its course. The therapeutic value of antiplague serum has been by no means decisively proved. British physicians who have investigated Yersin's statements place but little faith in his statistics claiming favorable results.

The following is the report of the British Plague Commission, treating of Haffkine's antiplague inoculation.

" 1. Inoculation sensibly diminishes the incidence of plague attacks on the inoculated population, but the protection which is afforded against attacks is not absolute. On the one hand plague has attacked persons who have undergone inoculation as many as four times in the ocurse of two years previous to their attack. On the other hand, as many as eight per cent. of the inoculated population may suffer from plague. Many varying influences have been at work in determining the rate of attack in different places, and it is impossible to give a numerical expression for the measure of protection against attack which inoculation confers.

" 2. Inoculation diminishes the death-rate among the inoculated population. This is due not only to the fact that the rate of attack is diminished, but also to the fact that the fatality of the attacks is diminished. Here again no numerical expression for the amount by which the death-rate is diminished can be given.

" 3. Inoculation does not appear to confer any great degree of protection within the first few days after the inoculation has been performed. This fact, we may note in passing, has an important bearing

on the risk of infection which would be incurred by recently inoculated persons if they were left behind in surroundings so plague-infected as to render their evacuation by the uninoculated desirable.

"4. Inoculation confers a. protection which certainly lasts some considerable number of weeks. It is possible that the protection lasts for a number of months. The maximum duration of protection can only be determined by further observation.

"5. The varying strength of the vaccine employed has apparently had a great effect upon the results which have been obtained from inoculation. There appears to be a definite quantum of vaccinating material which gives the maximum amount of protection, and provided that this quantum can be injected in one dose, and provided also that the protection turns out to be a lasting one, re-inoculation might with advantage be dispensed with. The best results from inoculation will only be obtained after an accurate measure of standardization has been devised."

In regard to the feasibility of adopting inoculation as a general plague measure the Commission formulate the following conclusions:

1. Experience gained hitherto has shown that it is very seldom possible to get a large proportion of the inhabitants of an uninfected place inoculated.

2. It has been possible, where the inducement of exemption from segregation and eviction has been offered, to get a large proportion of the inhabitants of an infected place inoculated quickly.

3. It has been possible in one place, Mysore city, even where no inducement that touched the great mass of the people could be offered, to get a considerable proportion of the inhabitants of an infected place inoculated quickly.

4. It has been possible, also, to induce a large proportion of particular communities, such as the Khojas of Bombay and Karachi, to be inoculated under the influence of their leaders.

EXPERIMENTS WITH LUSTIG'S PLAGUE SERUM.—These experiments, in which four hundred and three patients received the serum treatment and one thousand one hundred and ninety were treated by ordinary methods, give a good opportunity for comparative study. The clinical effects of the serum were watched from day to day, and, although in some very grave and advanced cases the patient ultimately succumbed, the immediate effects on the general condition of the patient were extremely well marked, indicating that the dose of the serum was too small, that the serum was not strong enough, or that the treatment was commenced too late. The statistics of these cases show that there was recovery in 38.2 per cent. of those treated by the serum treatment,

while it was only 19.5 per cent. in those treated by the ordinary methods. A second series of one thousand cases placed under observation, five hundred to be treated by the serum and five hundred by ordinary methods, gave a result of 18.08 per cent. in favor of the serum treatment.

YELLOW FEVER.

Yellow fever in Mexico and Central America will in the future, especially if we undertake the building of the Isthmian Canal, be a subject of great interest to the United States, and of added importance to the quarantine authorities, particularly in the various ports on the Gulf of Mexico. Vera Cruz is the place to be most dreaded. Fortunately, the quarantine regulations are strict, and all freight and passenger traffic, with the exception of a few steamers which trade between Pascagoula, Mississippi, and New Orleans, has been deflected to the northern ports. The bulk of the passenger traffic goes to or through Havana, and the danger of infection of that city thereby can be averted only by an absolute quarantine or by the hearty co-operation of the Mexican health officers. The railroads are a source of dangerous communication, and it is only by a constant vigilance on the part of the hospital officials on the border that yellow fever is kept out of the United States as successfully as it now is.

" Public Health Reports" says that the prevalence of yellow fever and Chagres fever on the Isthmus of Panama during the construction of the canal by the French should be borne in mind if the United States government undertakes to finish this canal. There is an infected territory from ocean to ocean, and the importation of a large number of non-immune workmen would be the signal for an outbreak. The whole isthmus should be disinfected before any workmen are imported, and a thoroughly equipped, strictly enforced maritime quarantine maintained at Panama and Colon. This should be done for the protection not only of the army of workmen that will be necessary for such an undertaking, but also of the inhabitants of the States which will be in direct communication with the isthmus as soon as timber and supplies are needed for the construction of the canal. The route of the Nicaraguan canal is not infected with yellow fever and there is no history of any infection having been in the country for many years. There should be suitable quarantine stations maintained at each end of the canal, and they should be the first things constructed. To whichever route is selected, there will be a rush of people from all over Central and South America, coming from infected localities and bringing the infection with them.

No serious attempt has ever been made to extirpate yellow fever in any of the South American republics. The towns along the coast are, as a rule, the most unhealthy localities, and, owing to these unsalubrious conditions and to poor pay, the physicians furnished by the government are by no means of a high order. The existing state of affairs in Central and South America is such a constant menace to the health of the inhabitants of the United States that it is somewhat strange that our government does not try its persuasive powers or even exert some pressure to induce the republican governments to initiate sanitary reform.

MOSQUITOES AND YELLOW FEVER.—Nearly twenty years ago Dr. Charles J. Finlay, of Havana, advanced the theory that the mosquito acted as the agent of transmission of yellow fever. Since the experiments with the mosquito in the propagation of malaria, and with the rat and the rat-flea in that of the plague, new life has been given to the mosquito theory in reference to yellow fever, and numerous investigators have recently taken up the subject. Dr. Finlay does not regard the mosquito as the intermediate host of yellow fever, but considers that the disease can be directly communicated by the mosquito to man. He argues by the process of exclusion that the malady is not infectious by direct contact, by the emanations of a sick person, or by the use of contaminated food or drink; but contends that the yellow fever germ is pathological only when introduced in a less trivial manner, probably in inoculation under the epidermis or even directly into a blood-vessel.

A commission, consisting of three army surgeons, has recently accomplished good work in this line in Havana, and their conclusions were as follows: (1) The blood taken during life from the general venous circulation on various days of the disease, in eighteen cases of yellow fever successfully studied, gave negative results as regards the presence of the bacillus icteroides (Sanarelli). (2) Cultures taken from the blood and organs of eleven yellow fever cadavers also proved negative as regards the presence of this bacillus. (3) Bacillus icteroides (Sanarelli) stands in no active relation to yellow fever, but when present should be considered as a secondary invader in this disease. The deductions drawn from the second part of the studies read thus: " The mosquito serves as an intermediate host for the parasite of yellow fever, and it is highly probable that the disease is only propagated through the bite of this insect."

The conclusions relating to the Sanarelli bacillus are not convincing, but those of the second part are far more suggestive and interesting, and were arrived at as the result of eleven experiments upon non-immune human subjects who allowed themselves to be bitten by mos-

quitoes which had been previously fed upon yellow fever patients. Of these experiments, nine results were negative and two positive. In one of these two positive cases other sources of infection, it is stated, were clearly excluded. The mosquito *Culex fasciatus* (*Fabr.*) was also isolated. The theory, of course, is identical with that of the transmission of malaria, and it may be found that the *Culex fasciatus* (*Fabr.*) is the brother sinner of the *Anopheles*.

The majority of investigators agree that yellow fever is not contagious in the strict sense of the word, but that its micro-organism will infect certain circumscribed areas or sections conveyed thither perhaps by fomites; that maritime commerce has hitherto been the principal means of its dissemination; that it is not conveyed by food, by water, or by aërial diffusion; that soil has no apparent influence on its origin and spread, but that climate undoubtedly has. Inspector-General Turnbull, R.N., contends that environment is the immediate cause of yellow fever, and that whenever improved sanitation supplanted a wholly unsanitary state yellow fever disappeared. It is true that there are no facts known with regard to yellow fever which render the theory that the malady is spread by the mosquito quite tenable; on the contrary, many appear to be unfavorable to such a theory. In this connection it must be remembered that the prevalence of yellow fever in a given district is not always coincident with the presence of mosquitoes. In our own epidemics of 1888 and 1897 the districts invaded were almost entirely free from the insect,—at least they were not so numerous as to be a pest; but the spread of the disease was in every instance duly explained by fomites in the nature of bedding or wearing apparel packed in an epidemic centre. Much more experimentation must be made before the theory be established on a sound basis.

Experimental Tests at Vera Cruz, Mexico, of the Doty-Fitzpatrick Serum for the Prevention and Cure of Yellow Fever.—Matienzo reports, from numerous experiments, that, although both intravenous and subcutaneous injections of the serum produced a general reaction, they neither controlled the disease nor modified the appearance, development, or duration of the symptoms of yellow fever. The number of cases in which it has been used is too small to justify a positive conclusion. The reaction in convalescents of yellow fever confirms Sanarelli's assertion that the curative power of the serum in animals is not due to an antitoxin, and, by its analogy to typhoid serum, proves the *Icteroides* to be an *Eberthiform* bacillus.

SCURVY.

Scurvy has been known from the earliest times, prevailing mostly among sailors on long voyages and soldiers in the field. But it is now nearly eradicated even from armies and on shipboard and is becoming an almost unknown disease. In spite of the fact that large fields were formerly offered for the study of scurvy, much doubt still exists regarding its etiology and pathology. The previous views as to its causation have been decidedly upset by recent investigations by Mr. Jackson and Dr. Vaughan Harley. They believe that neither lime-juice nor fresh vegetables prevent scurvy and that it is not caused by the absence of these from the dietary, but that it is produced by eating tainted food. This opinion, that scurvy is essentially due to poisoning by the ptomaines of tainted meat, was first propounded by Professor Torup, of Christiania. These two observers maintain that other causes, such as improved sanitation, better quarters for the men, shorter voyages owing to the increased use of steam, and, above all, better food, should get the credit for having swept away scurvy, rather than the introduction of lime-juice. They further consider that evidence has shown, in certain instances in which men have unwillingly experienced the effects of ptomaine poisoning, that scurvy is produced by the eating of tainted meat and not by the want of fresh vegetables.

In order to test this view by experiment, monkeys were fed on tinned Australian beef. The experiments were divided into three groups. In the *first* the monkeys were given daily, together with boiled rice, fifty grammes of meat from a freshly opened tin, together with maize. In the *second* group the same food was given, except that the meat was taken from tins which had been open for a few days and had stood in the laboratory. In the *third* group the monkeys were given the same diet as those in group two with the addition of either an apple or a banana daily to each.

In the first group no signs of scurvy appeared, but in the second and third groups symptoms showed themselves which were considered to be characteristic of scurvy. The observers concluded that their investigations afforded important confirmation of results derived from Arctic experience,—namely, that the use of fresh vegetables or lime-juice is not alone sufficient to prevent or cure scurvy, and that we must regard the condition of the food in general, and especially the state of preservation of the meat, as the essential factor in the etiology of the disease.

Staff-Surgeon Home, in charge of the hospital ship Gelunga, disputes these conclusions, maintaining that lime-juice and fresh vege-

tables prevent scurvy by acting as antiseptics. He points out that the two experimenters before named did not take care to administer ptomaines only, as the sour-smelling meat on which they fed the second lot of monkeys had not been sterilized, and the monkeys received not only ptomaines but also the living bacteria that produced the ptomaines. He further asks, "What is there in these experiments to prevent us from believing that the bacteria of putrefaction were taken alive into the mouths of the monkeys, there affecting the sordes around the teeth and setting up a gingivitis, going on to ulceration, infecting also the gastro-intestinal canal, and later these parasitic infections setting up the anæmia on which all the other symptoms of scurvy depend?"

Professor Wright places on record the results of a series of examinations of the blood of patients suffering from scurvy, which tend to show that the scorbutic condition is induced by a restricted dietary. Inasmuch as the food-stuffs that are excluded are those containing an excess of bases over mineral acids, while the food-stuffs (meat and cereals) remaining are those containing a preponderance of mineral acids over bases, it is obvious that the scorbutic condition is one that supervenes on the ingestion of a considerable excess of mineral acids over bases. In view of these considerations it seems probable that scurvy is a condition of acid intoxication very similar to that which can be experimentally produced in herbivora by feeding to them a surplus of mineral acids. Professor Wright finds further justification of this theory in the fact that the scorbutic condition is remedied or alleviated by the addition to the dietary of any one of a whole series of different substances, as tubers, corn, vegetables, decoctions of leaves and growing shoots, etc., which contain an excess of bases over mineral acids. The treatment adopted by him in the cases which he records yielded most satisfactory results, which undoubtedly bear out his theory. In all the patients the alkalinity of the blood was strikingly reduced, and a marked amelioration of the condition followed upon the exhibition of lactate of soda and similar substances.

RHEUMATISM.

TREATMENT OF RHEUMATISM, WITH SPECIAL REFERENCE TO PROPHYLAXIS AND CARDIAC COMPLICATIONS.—This was the subject of a very interesting clinical debate before the Chelsea Clinical Society, of England. In the more modern text-books rheumatism has been removed from the section on general diseases and placed among the specific fevers. Osler, for example, defines rheumatic fever as " an acute, non-contagious fever, dependent upon an unknown infective agent, and characterized by multiple arthritis and a marked tendency

to inflammation of the fibrous tissues." At this debate a new definition was suggested by Dr. Garrod, in the following words: "A systemic disease with arthritic and cardiac manifestations." The supposition that the disease is caused by a pathogenic organism was thoroughly discussed, and agreed to by most of those present. The profession are certainly prepared to welcome the discovery of a microbe as responsible for rheumatic disease, if it be duly accredited by scientific investigation. The main interest of the debate centred in the treatment of acute rheumatism by the salicylates. The alkaline treatment has many supporters, and was shown to be of undoubted value under certain circumstances. The general opinion expressed was that the salicylates should be given in large and repeated doses at first, any indications of idiosyncrasy on the part of the patient being watched for, and after the pain and temperature had subsided the dose should be gradually decreased, but that the use of the drug should be maintained for some time. Owing to relapses which not infrequently manifest themselves, the salicylates have fallen somewhat into disrepute. It is very difficult to convince patients, when the active symptoms have abated, that the disease is not yet at an end, and it should be insisted upon that there should be absolute and prolonged rest after the subsidence of the symptoms. The effects of the salicylate compounds on the heart were thoroughly discussed, and it was maintained that statistics proved that cardiac disease following rheumatic fever had not been lessened by the introduction of the salicylates. In regard to the treatment of endocarditis it was averred that digitalis does no good, and that rest and the continuance of the salicylates are the main points to be observed. It was pointed out that complete rest may be overdone, and in some of the most chronic cases valuable help may be obtained from gradual muscular exercise and baths. It was maintained that treatment by small blisters along the course of the first and second dorsal nerves materially lessens the cardiac complications. Powell thought opium to be of great value in myocarditis, in grave forms of endocarditis, and especially in pericarditis.

THE DIET IN RHEUMATISM.—W. Ewart (*Lancet,* March 17, 1900) believes that rheumatism is in part a dietetic disease, and that in the wide range of our cases the "feeding" plan needs to be represented as well as the "starving" plan. In rheumatic fever the diet cannot be too light. Nature refuses food and the state of the tongue forbids it, but plenty of water is needed to clear the way for food. The source of the over-supply of lactic acid has been traced in our theories to the decomposition products of muscle, and therefore meat and beef-teas have been generally held to be detrimental; but the inability of some

patients to manage milk diet has led him to question whether milk might not in them keep up the rheumatic tendency and become the recurring supply of acid. There is evidence that fermentation is set up in the stomach as well as on the tongue, and this is another source of dilatation of the stomach to which the writer calls special attention. He has arrived at the conclusion that administering a small quantity of salt (fifteen grains to the half-pint) or adding it to the milk is an important indication in all cases of exclusive milk diet, and usually renders its previously difficult digestion easy. This is also an indication in dyspeptic infants who are sometimes supposed to be intolerant of milk. Dr. Burney Yeo, in his "Manual of Medical Treatment," recommends a salted alkaline milk drink in acute rheumatism. A temporary vegetarian diet seems to be as much indicated by the rheumatic state as the avoidance of animal food, and in refractory cases it is possible that the administration of soups made of a variety of vegetables will supply the nourishment as well as in part the medicine required. While meat renders urine acid, vegetables render it alkaline, and this is the result to be aimed at.

GENERAL MEDICAL SUBJECTS.

RECOVERY FROM LEPROSY.—In the June number of the *Polyclinic* Mr. Hutchinson relates a number of cases showing that away from the localities where the disease is endemic recovery from leprosy is possible. He expressly guards himself against captious criticism by explaining that by recovery he means termination of the disease process, not removal of its effects. To support his views on this matter, several cases were shown, in one of which the treatment by small doses of arsenic, a liberal diet, and abstinence from fish was carried out for ten years. The latter article of diet is prohibited, as Mr. Hutchinson considers that leprosy is due to the eating of raw fish, salted, dried, or decomposing. No bacteriological examinations seem to have been made in his cases.

THE DIAZO-REACTION IN CASES OF TUBERCULOSIS.—The diazo-reaction has been found to be of considerable diagnostic significance in cases of pulmonary tuberculosis as it is of grave prognostic importance. Michaelis, in the *Berliner klinische Wochenschrift,* 1900, No. 13, says that the occurrence of the reaction is independent of fever, of the number of tubercle-bacilli present, and of the amount of sputum, but often a parallelism is observed in all of these. The reaction cannot be obtained, as a rule, in mild cases, although it appears when acute complicating infections supervene that do not themselves give rise to the reaction, such as pleurisy, pneumonia, and influenza. When the

reaction is marked in cases of incipient tuberculosis, the disease must be considered serious and the prognosis grave. On the other hand, in advanced cases, even with cavities, when the reaction is absent, the course of the disease appears to be stationary or slow. The reaction may disappear after it has been pronounced and the condition of the patient has improved, but usually subsequent aggravation takes place. The administration of preparations containing tannic acid or gallic acid interferes with the results of the reaction, but without influencing the prognosis. Among one hundred and sixty-seven cases of pulmonary tuberculosis in which the reaction was studied, it was present in one hundred and eleven patients and absent in fifty-six. Of the latter, five were discharged cured, forty-three improved, five not improved, and three died; while of the former, none were cured, fifteen were improved, three were transferred, thirteen were not improved, and eighty died.

DIFFERENCES BETWEEN CRETINISM AND MONGOLISM.—Sutherland [1] sums up the differential diagnosis of mongolism and cretinism in infancy as follows:

Cretinism.	*Mongolism.*
1. Characteristic features seldom present before the sixth month.	1. Present at birth.
2. Dull, impassive infants, taking no notice of anything or any one; face expressionless, of a lower animal type, "toad-like"; absence of active movements.	2. Smiling, grimacing infants; shy, but observant, imitative; active movements present.
3. The skin swollen, dry, scaly; fatty deposits in neck; hair coarse and scanty.	3. These changes absent.
4. No characteristic skull changes.	4. The skull flattened anteroposteriorly, brachycephalic.
5. The palpebral fissure *appears* small from swelling of eyelids; epicanthus not present.	5. The palpebral fissure *is* small and obliquely placed, without swelling of lids; epicanthus marked.
6. The tongue is very large, swollen, and protruding.	6. The tongue is large, often protruded, but not swollen.
7. The lips are thick, immobile, and everted.	7. The lips are mobile, pursed up, and everted on movement or crying.
8. Congenital heart disease rare.	8. Common.
9. Relative size of fingers normal.	9. Little finger short and curved; thumb short.
10. Thyroid gland absent or atrophied.	10. Thyroid gland normal.
11. Marked benefit received from thyroid gland treatment.	11. No benefit.

[1] Lancet, January 6, 1900.

FIG. 2.—Case of mongolian imbecility.

FIG. 3.—Case of cretinism.

In well-marked cases these differences will usually allow of an exact diagnosis being made, but as in other affections one not infrequently meets with slightly marked cases in which the symptoms are not pronounced, and many of them may be absent. In such a case the special Mongolian characteristics on which stress should be laid are the active movements of the face and limbs as contrasted with the lethargic state and expressionless face of the cretin. The smiling face of the Mongolian imbecile suggests the possession of some secret source of joy, while the somewhat sad countenance of the cretin suggests the cherishing of a secret sorrow. A careful investigation as to anatomical defects and changes will usually reveal the presence of some of these which are sufficiently characteristic. The final test is the therapeutic one, as under the administration of thyroid gland the cretin will in time show changes of a most striking character while the Mongolian infant will remain unaffected. (Figs. 2 and 3.)

VALUE OF X-RAY EXAMINATIONS.—Williams,[1] in a paper on the value of x-ray examinations in thoracic aneurisms and new growths, says that aneurisms of the thoracic aorta may be seen by the x-rays before there are physical signs, and that where it is desirable to be sure that no thoracic aneurism exists the x-ray examination can render much service. He has examined with the x-ray thirty-four cases where aneurism was suspected, and one case to determine the size of the heart, when an unexpected aneurism was discovered. Of these cases, fifteen had typical aneurisms; six had more or less dilatation of some portion of the aortic arch, but there was no pulsation. This abnormal appearance was proved by an autopsy to be due to a mass of glands. The remainder gave normal outlines in the region where an aneurism had been suspected.

THERAPEUTICS.

HEROIN IN RESPIRATORY AFFECTIONS.—Henry D. Fulton, from his experience with this drug in the treatment of simple bronchitis, bronchitis with measles, the bronchitis of influenza, chronic catarrhal bronchitis, phthisis, and pneumonia, gives its action as follows. The effects of heroin as a cough-relieving agent were prompt and definite, the degree of comfort afforded to the patient being marked especially in harassing, incessant, or paroxysmal cough. The administration of the drug was begun early in the afternoon (in a case of laryngeal phthi-

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[1] Boston Medical and Surgical Journal, January, 1900.

sis) and continued every three hours till nine o'clock in the evening, the dose being one-sixteenth of a grain. " In the acute bronchitis of children," says the author, " its employment is followed by prompt amelioration of cough and it apparently moderates the severity of the attack. In chronic bronchial catarrh it seems to have a positive curative value." In measles, when the bronchial irritation is a prominent symptom, nothing else was found so serviceable as heroin (from one-thirty-second to one-sixteenth of a grain per dose) to tranquillize the persistent cough. A solution of heroin for hypodermic injection, prepared by the addition of a small amount of acetic acid, was found equally as efficacious as morphine and less objectionable in certain cases of spasmodic asthma. Maximum doses of heroin produce gastric disturbance similar to that following the administration of morphine, but in a lesser degree, and its desired effects can usually be obtained by smaller doses without causing any derangement of the digestive functions. Heroin, which is the diacetic acid ester of morphine, was introduced for the purpose of allaying cough and as a substitute for codeine. It is poisonous only when given in an amount one hundred times that of the efficacious therapeutic dose. It is supposed to produce sedation of the peripheral sensory nerves of the respiratory tract without depressing the respiratory centre. The dose is from one-tenth to one-eighth of a grain. In a case of pseudoleukæmia in our practice the continuous use of the drug gave rise, several weeks before death, to intense itching of the skin.

HOLOCAINE.—This is another new remedy, which is particularly useful as a local anæsthetic in ophthalmic surgery, and possesses the advantage over cocaine of not causing mydriasis and, therefore, not increasing tension. It does not affect accommodation, but produces a greater degree of anæsthesia of the iris than does cocaine and relieves severe and painful inflammation, while, unless swallowed or injected subcutaneously, it does not produce poisoning. It has no roughening influence on the cornea, and is strongly antiseptic in its action. It may be employed in a one-half to one per cent. solution.

UROTROPIN, a compound containing formaldehyde, is of value in the treatment of cystitis associated with phosphatic and alkaline urine, and also in preventing the spread of infection by typhoid fever germs, since it so disinfects the urine of typhoid patients that the bacillus of Eberth is destroyed. The dose is eight grains dissolved in one-half to one tumblerful of water and taken three times a day.

VANADIUM appears to act much like arsenic or iron in the transference of oxygen. Vanadate of sodium has been administered in doses of one to five milligrames in twenty-four hours, on an empty stomach, for

two or three days at a time. It causes a rapid improvement in appetite, strength, and weight. Its administration is followed by some increase in the liquid and solid constituents of the urine, with a diminution of sugar in diabetes.

SIDONAL.—Sidonal, a combination of chinic acid and piperazine, according to Dr. Blumenthal,[1] really has a great effect in checking the formation of uric acid without causing its retention in the system, and also increases the quantity of hippuric acid, which, being very soluble in water, is without injurious effect. V. Leyden believes it will be of importance in the uric acid diathesis. He has used sidonal in private as well as in hospital practice, and says that it was well borne, has no disturbing influence, is taken readily, and the attack is favorably influenced by it. It is not yet known whether an attack could be cut short by it. Jacques Meyer has employed sidonal in cases of typical gout and renal concretions, giving a daily dose of five grammes, one-half in the morning and the other in the evening, for seven days. No unpleasant effects were observed; the attack ran a quicker course, the pain and swelling passed off sooner, and the power of movement returned earlier than usual. In the cases of renal concretion subjective symptoms were either diminished very considerably or disappeared altogether after its administration.

KRYOFIN.—Breidenstein[2] says that kryofin has produced very good results in all forms of headache, migraine, hemicrania, meningitis, nervous diseases, and syphilitic periostitis; also in many cases of neuralgia, neuritis, pleuritis, angina, and the lancinating pains of tabes dorsalis. Eichhorst mentions a case of alcoholic polyneuritis in which kryofin in doses of seven and one-half grains three times a day effected a rapid improvement. He describes the action of kryofin in fresh cases of sciatica as almost wonderful.

NIRVANIN.—C. H. Elsberg, as a result of his observations on this drug, says that it has anæsthetic properties when injected, and that it is less poisonous than cocaine or eucaine, with the added advantage of suffering no change by age or boiling. A solution of one per cent. has distinct antiseptic properties, and can be kept on hand without undergoing change.

KAKODYLATE OF SODIUM IN PSORIASIS.—Neumann[3] has used this drug by injection, with marked relief, beginning with a solution of two to twenty and increasing to six to twenty. After twenty injections the eruption began to subside, and after thirty no more scales were

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[1] Medical Press and Circular, March 28, 1900.
[2] The Therapist, April 16, 1900.
[3] American Journal of the Medical Sciences, February, 1900.

present. Although the amount of the drug used contained about ten grammes of arsenic, no untoward effects were noticed.

TREATMENT OF PULMONARY TUBERCULOSIS WITH SODIUM CIN-NAMATE.—Landerer and others report successful results from the use of this remedy, and Ewald after giving four hundred and sixty-one injections considers the drug to be well worthy of further trial. In a number of cases treated by him, the diagnosis in nearly all being positive, marked relief was afforded, pain being mitigated and expectoration taking place more readily. The ultimate result varied from recovery in a few cases to no improvement whatever in others, although treatment with increasing doses of from one to fifteen milligrammes (one sixty-fourth to nearly one-fourth of a grain) of the drug, injected intravenously on all alternate days, was continued as long as ten months.

QUININE IN MALARIA.—Manson at the 1900 meeting of the British Medical Association said that the reputed prophylactic action of quinine is but a phase of its therapeutic action: it is the application of the drug to the parasite, and not an immunizing of the body against the entrance of the parasite, that we have to deal with; it will prevent the development though not the introduction of the germ. Its prophylactic power is greatest in those cases—e.g., benign tertian—where quinine given therapeutically exerts a marked effect on the parasite. The manner and conditions under which the drug is given should be carefully observed. He also recommends that, in future, experiments in prophylaxis be made with the aid of the microscope, and in reference to the particular type of malarial parasite it is used against, and also that the gastro-intestinal condition of the individual experimented on be investigated and recorded.

SALT SOLUTION AND GELATIN.—One of the newer therapeutic measures in the treatment of grave and pressing complications is the hypodermic injection of sterilized salt solution containing gelatin, for the purpose of arresting hemorrhages which cannot be stopped by means of direct applications or compresses. The injection commonly employed consists of eighteen grains of ordinary gelatin and eighteen grains of sodium chloride in two ounces of distilled water, which should be administered in two equal doses with an antitoxin syringe. In the treatment of an aneurism by this method an injection every day or every other day is sufficient. In more pressing cases, where the gelatin is to be used but for a short time, two injections may be given in the same twenty-four hours.

TAKADIASTASE.—This preparation, in combination with some bitter substance like nux vomica, or a general tonic like arsenic, will often

afford immense relief in dyspepsias arising from faulty digestion of starches.

MANAGEMENT OF THE HAIR DURING AND AFTER FEVER.—Jackson [1] strongly advises against shaving, believing that the hair will come again in as good condition without this procedure as with it. He says that the hair should be brushed and combed daily, and once or twice a week a little pomade, containing a drachm of precipitated sulphur to the ounce of good cold cream, should be well worked into the scalp, or a three per cent. solution of resorcin in oil and alcohol may be used daily. Once in two or three weeks the hair and scalp are to be washed. For the shampoo tincture of green soap is recommended; the patient should be directed to invert the bottle on a piece of flannel, dip the flannel in warm water, and use just as little soap as will make a good lather. The soap should be washed out, the hair carefully dried, and a little of the pomade rubbed into the scalp to take the place of the natural oil removed in the washing.

LOCATION OF FOREIGN BODIES IN THE EYE BY THE RÖNTGEN RAYS.—Sweet has used the Röntgen rays in the detection of foreign bodies in the eye, with most gratifying results. The correctness of the determinations is not influenced by the character of the metal nor by the situation of the body, whether in the posterior or anterior portion of the globe or in the orbit. He believes that in every case of injury to the eye from flying pieces of metal, where the clouded media prevent the use of the ophthalmoscope, a radiograph should be made at once to determine whether the metal has lodged in the eyeball. If the examination is negative, both surgeon and patient are reassured; whereas, if the radiograph indicates that a foreign body is in the eye, an attempt to remove it may be made before a firm exudate has been formed about it.

ELECTRICAL BURNS.—In treating such burns Elder [2] keeps the parts immersed in a warm carbolic bath of 1 to 100 and carefully watches for any indication of hemorrhage as the necrotic process goes on, being prepared with an Esmarch bandage to check the bleeding as soon as it appears. When rendered necessary by necrosis or secondary hemorrhage, the sloughing tissue should be removed, even if this requires an amputation, which, however, should not be done as in ordinary cases of burns. Ordinarily, if we form our flaps well above the line of demarcation, we may sew them up and expect primary union. But not so here; we must expect sloughing in the stump,

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[1] New York Medical Journal, May, 1900.
[2] Montreal Medical Journal, January, 1900.

not perhaps of the skin itself, but of the muscles, even as high as their attachments. We should simply excise the necrosed portions along the line of demarcation, and leave the wound open, to be dressed with moist antiseptic dressings, allowing the stump to granulate and to be subsequently covered with skin-grafts. The result where no skin-grafting was resorted to was similar to that obtained in other largely denuded areas, and the skin-grafting gave good results.

TROPICAL DIARRHŒA.—Albert A. Gore,[1] in regard to the treatment of this disease, states that during the period of enforced tropical residence everything that tends to lower the vital powers or nervous system should be avoided; habits should be steady, methodical, and regular; the amount of exercise sufficient, but not in excess of the powers of the individual; the diet moderate and not stimulating; the number of meals not excessive, and stimulants of the best quality used only in moderation when the vital energy is exhausted. The luncheon should be very light and the dinner of few courses and of the best ingredients obtainable. Bazaar supplies are, as a rule, a great drawback, and should be discarded for the individual's own poultry and sheep. All water should be carefully boiled, milk sterilized, and the native kitchen most carefully superintended. Periodically there should be intervals of complete change and recreation away from the usual place of abode. With these precautions the system will be in the best condition to resist disease, which will also be more amenable to treatment, should it occur.

THE SALINE TREATMENT OF DYSENTERY.—In an article published in December, 1898, W. Y. Buchanan gave details of one hundred and two consecutive cases of dysentery treated by a saturated solution of sulphate of magnesium, with only one death. He now gives [2] an account of four hundred and fifty-three more cases of the same disease, with only five deaths. This makes a total of five hundred and fifty-five cases of dysentery treated by salines, with only six deaths,—a mortality of only 1.08 per cent. The four hundred and fifty-three cases here referred to were met with in Bhagalpur; they were of all types and forms, just as they occurred from day to day. The one hundred and two cases first reported were all treated with magnesium sulphate, which was found to act admirably, promptly, and efficiently. The supply of that drug running short, sodium sulphate was substituted, with results so gratifying that its use was continued. The following mixture has been found satisfactory for general use.

R Sodii sulphatis, ℥j;
Aquæ fœniculi, ad ℥iv. M.

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[1] Dublin Journal of Medical Science, February, 1900.
[2] British Medical Journal, February 10, 1900.

Half an ounce of this mixture was given three or four times a day. Purgation should be free but gentle, and, when bright yellow stools without a trace of blood or mucus are passed, the drug should be stopped, to be resumed at once if blood or mucus reappear in the stools. It is usually found that after five or six stools all blood and mucus have disappeared from the dejecta, but in many cases they reappear in a day or so, when sodium sulphate must again be given. This highly yellow "bilious" stool is characteristic of this drug. In chronic and relapsing cases one or two doses of sodium sulphate were given, and then bismuth and soda or other intestinal antiseptics. For every return of blood and mucus a dose of sodium sulphate was administered, or, if scybala were present, a dose of castor oil and laudanum. If intestinal worms be seen or suspected, santonin or male fern should be given. Salines (except in the limited doses mentioned above) are considered to be harmful in cases where there is ulceration of the large intestine. In ordinary cases the acute stage under this treatment is over by the third or fourth day, and if the stools remain free from dysenteric products the writer gives a tonic of iron or nux vomica and quassia. New acute cases were fed on "mar" (a kind of rice porridge) and "dahi" (made daily from the milk) eight ounces of each mixed together two or three times in the twenty-four hours. This diet was continued for two or three days, or until the stools became semi-solid, when rice, milk, and soup were added. When bael fruit is obtainable, it is good to give it in the form of a sherbert along with the "dahi" for the early morning meal, especially in chronic cases, together with mango pickle or other antiscorbutic.

THE RADICAL TREATMENT OF EPITHELIAL CANCER BY ARSENIC.—According to Ctrunecek, of Prague,[1] Australia, it is almost certain that some cases of epithelioma have been cured by arsenous acid. The remedy has, however, fallen into disuse, on account of errors in diagnosis and a more or less just prejudice against the treatment. The first real step in advance was made by Hue, who injected an aqueous solution of arsenic into the midst of a cancerous mass. The experiments of Billroth and Von Esmarch are well known, yet these authorities say they have never seen a single case of cancer cured by arsenic.

> ℞ Acidi arsenosi, pulv., one gramme;
> Alcoholis (ethyl) absoluti,
> Aquæ destillati, āā seventy-five grammes. M.
> Sig.—For external use.

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[1] Medical Record, June 2, 1900.

The remedy is applied as follows. The ulcer or previously denuded surface is cleansed and dried. The arsenic mixture is then stirred and spread with a brush over the whole surface of the tumor, and left to dry without a dressing. If at the end of five minutes the patient feels no pain, another layer of the mixture is applied. Slight pain is sometimes felt after the application. In a day or two the neoplasm will be found to be covered with an eschar, which is not removed, but treated daily with the preparation of arsenic. If acute œdema of the surrounding parts be caused by the application, the treatment is suspended until the swelling has disappeared, when the remedy is used in lessened amount. The crust, thin, yellowish, and firmly adherent at first, becomes gradually black, thicker, and finally separates, with the appearance of a greenish fluid. Treatment is continued regularly until the eschar is freely movable, non-adherent to the adjacent tissue, and is easily removed or falls off. This eschar is of variable thickness, is hard in consistency, and is essentially formed of cancerous tissue which has mortified under the influence of the arsenic. The scab being removed, a single application of the arsenic mixture is made to the bottom of the ulcer, which, if cure has been obtained, produces merely a yellowish crust which can be easily removed without causing any hemorrhage, but, if there is an adherent dark crust, the remedy must be continued. During the course of the treatment, as the eschar thickens, the amount of arsenic should be increased. If no vestige of cancerous tissue remains, the neoplasmic ulcer is covered with a fine whitish membrane without induration, and is treated as an ordinary granulating wound. For the success of this treatment it is essential that the neoplasm be free from induration and also in a position where it can be reached by the medicament, as in the case of all non-relapsing cancers of the skin, no matter what their extent, cancers of the external auditory meatus, cancers of the lips and the accessible parts of the buccal mucous membrane, and cancerous lesions of the larynx in their early stages. The author claims that this procedure destroys every vestige of cancerous tissue without injury to normal cells. In no case has he ever been obliged to apply a ligature, for the cancer was always eliminated without loss of blood. The arsenous acid had no effect upon the organism, even when the lesion was situated in the mouth and where treatment extended over several months. He declares that this method is the only one possible in persons suffering from diabetes, hæmophilia, etc., in whom even a slight operation might cause serious or even fatal hemorrhage, and when operation is refused. As to the duration of treatment, it would appear that the greater the ulceration the more rapidly the remedy acts.

A NEW TREATMENT OF TAPEWORM.—Kime [1] reports that failure to secure the head of a tapeworm is often due to the fact that the parasite is carried into the lower bowel and has time to re-attach itself before its body is expelled. He therefore ties the protruding part of the worm about three inches from the anus of the patient, and then injects half a grain of morphine directly into the body of the worm. After a short time a large injection of water is given, and the upper portion of the worm will pass out motionless and apparently dead. Most tapeworms have a pair of longitudinal vessels extending from one extremity to the other, so that a substance injected into any segment will reach every portion of the parasite. An elaborate preparatory treatment is quite unnecessary. The patient omits breakfast, and about nine o'clock receives a dose of infusion of pomegranate, or, what is far better, of pelleterin tannate with one or two drops of croton oil; he then remains in bed under observation for two or three hours or until movements of the bowels occur. If the worm passes, well and good. If only a part protrudes, the morphine should be injected into the worm.

THE SCHOTT TREATMENT OF FATTY HEART.—Professor Theodor Schott, of Nauheim,[2] criticises various modes of treating fatty degenerations of the heart and defines the conditions under which the treatment associated with the names of himself and his brother may be expected to give the best results attainable. As is well known, this system consists in the careful use of finely graduated exercises, of suitable diet, and of baths. Professor Schott is opposed to all systems of dealing rapidly and severely with accumulations of fat. The dietary which he thinks most conformable to the reliable investigations of Pettenkofer and Voit is that of Oertel. But, unfortunately, Oertel combined with their formulæ a great reduction of liquids and the well-known climbing exercises, the effect of which was often the very opposite of that desired,—viz., the production of an insufficiency of heart muscle. Experiment shows that the fat and muscles of the body may be much reduced without any appreciable diminution of the heart fat. Schott's mechanical treatment consists in exercises of resistance or self-resistance. He thinks it can be safely undertaken in all the different forms of fatty heart which are not too far advanced. Similarly when the degenerative process is not far advanced the balneological and hydrotherapeutic part of the Nauheim treatment comes into use. It consists of "baths of gradually increased concentrations of salt, as

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[1] Practitioner, December, 1899.
[2] New York Medical Record, March 24, 1900.

well as baths with increased quantities of carbonic acid gas, and it is especially in fatty heart cases that we can have early recourse to the use of Sprudel- and Sprudelstrom-bäder (effervescent running baths)," unless there are contraindications thereto, such as chlorosis, anæmia, rheumatic or arthritic complaints, or old age, all of which require a warmer temperature; the baths are generally commenced at a temperature of from 88° to 86° F., with a duration of ten minutes. It is claimed for this treatment that with no loss of weight a decrease of the panniculus adiposus and of the abdominal masses of fat may be demonstrated and that the symptoms of fatty heart disappear.

GONORRHŒA.—The ever-present and always interesting subject of the treatment of gonorrhœa has occupied much of the attention of the medical profession during the past year, and has taken up considerable space in our own symposium of Genito-urinary Diseases published in Volumes iii. and iv. of last year's CLINICS. There is no single remedy or procedure infallibly capable of curing gonorrhœa in a limited period of time, and yet each month we read enthusiastic articles by supposed learned men, who state emphatically that this or that method of treatment will cure any case of gonorrhœa within a certain specified time. It is pretty generally agreed that an ordinary uncomplicated attack of specific urethritis is not a dangerous disease, but, once the disease is established, who can say what the complications or the extension of the disease may not lead to? Of these sequelæ, lymphangitis, adenitis, stricture, orchitis, epididymitis, with secondary impotence, prostatitis and suppuration of the prostate gland, cystitis, pyelitis, pyonephrosis, neuralgia, rheumatic affections of the joints and tendon sheaths, metastases to vital organs, endocarditis, tuberculosis, especially of the genito-urinary organs, neurasthenia of varying severity, and actual psychoses are a few of the possibilities which this much-belittled affection is liable to inflict upon its possessor.

In the treatment of gonorrhœa the therapeutic measures employed should be so applied that complications may, as far as possible, be avoided. Castor [1] advises against all abortive treatment, believing that it does not accomplish the desired object but favors the occurrence of complications. The symptoms of the disease do not appear until some days after the *Gonococci* have penetrated the mucous membrane of the urethra. The introduction of instruments into the urethra during the acute stage, so long as a florid, purulent discharge is still taking place, is contraindicated, as are also injections that induce irritation of the urethra or aggravate existing inflammation. In all cases, whether at-

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[1] Berliner klinische Wochenschrift, No. 12, 1900.

tended with marked inflammatory manifestations or not, injections may begin on the first day, but in those with inflammatory manifestations no remedy should be employed that causes irritation or aggravates the inflammatory process, such as preparations of silver. Under these circumstances permanganate of potassium in solution of from one to ten thousand to one to eight thousand is to be preferred. In the less acute stage injections of antiseptic silver salts are valuable, and of these the nitrate is the best. This may be employed first in a concentration of one to ten thousand and gradually increased to a strength of one to four thousand, but it should never be employed alone. Thus, a combination of nitrate of silver with permanganate of potassium is injected first, then nitrate of silver and sulphate of zinc are employed, and finally, in the last stage, permanganate of potassium and sulphate of zinc. The more frequently the injections are given the better. Attempts have been made to destroy the *Gonococci* and control the secretion by means of a single agent, permanganate of zinc, but this has not proved so satisfactory as the combination of permanganate of potassium and sulphate of zinc.

There are two varieties of chronic gonorrhœa that do not respond even to local measures,—namely, one that resists treatment of all kinds and another that yields only so long as the treatment is maintained but recurs as soon as this is suspended. The first is almost always glandular and infiltrating, and the other is accompanied by inflammatory processes in adjacent glands, especially the prostate. The former is rather uncommon, and its treatment should be jointly mechanical and chemical. Bougies may be used. The urethra may be cautiously and judiciously dilated. Local urethrotomy may possibly be undertaken, and injections and irrigations should be employed in the intervals.

The proportion of cases of chronic urethritis complicated with prostatitis is quite large. The diagnosis must be based upon the discovery, on microscopical examination, of leucocytes in the fluid expressed from the prostate gland through the rectum. The results of treatment in these cases are not very gratifying. Castration has been proposed in the treatment of prostatitis, but the results cannot yet be definitely estimated. The one certain and harmless means of influencing favorably the morbid process consists in systematic massage and expression of the glands. This should be done three times a week for months, by a masseur, while urethral injections are made or irrigation is practised.

Among the recent so-called specific treatments for this affection is one devised by J. A. O'Neill, of New York, which consists in the in-

ternal administration of methylene blue (one grain) in combination with oil of nutmeg (one drop) and oil of sandal wood (two drops). This mixture he administers three or four times a day for the first four days and afterwards twice daily. This treatment, he claims, will cure in from four to seven days. He describes it as irrigation from above— not of the urethra alone, but of the entire urinary tract,—in which there is no danger of forcing infection into remote recesses of the genito-urinary organs. The urine impregnated with the methylene blue not only kills the germ, but also carries away its corpse. He never uses this prescription for more than ten days without intermission, and while giving it instructs his patients to drink freely of water.

MEDULLARY NARCOSIS.—For an account of recent literature on medullary narcosis, see Department of Surgery, page 267.

SEROTHERAPY.

E. K. Dunham, discussing Ehrlich's "side-chain hypothesis," describes the terms natural immunity, active immunity, and passive immunity. Under ordinary circumstances the tissues of the body possessed a certain reserve of activity. When this is drawn upon, it is not merely replaced, but an additional store is laid by. Ehrlich supposes that such an excess of side-chain radicles may be stored up and appear in the circulation as an antitoxin. An animal may be naturally immune to substances poisonous to other animals. According to Ehrlich's theory, natural immunity would be the necessary result of the absence of side-chains having an affinity for a particular poison, and the blood of naturally immune animals would not contain any antitoxin because the conditions for its production were not present.

Active immunity is that which results when gradually increasing amounts of poison are introduced into the organism, whether in solution or formed in the body by the growth of bacteria. According to the theory of Ehrlich, a large dose of toxins arrests the function of the cells, but a smaller dose causes the formation of an additional store of side-chains. The theory also shows that the antitoxin introduced must bear a definite chemical relation to the poison which has called forth its production. An interesting fact is that other complex proteid poisons besides those of bacterial origin produce effects very similar to the latter, and may induce the production of antitoxins. Passive immunity differs from active immunity in that in the former the free antitoxins introduced into the blood

are not replaced by a fresh supply, but are gradually eliminated. In order to obtain a curative result from the use of antitoxins, it is necessary to use much larger quantities than are required to confer passive immunity. The antitoxic character of immunity and of immunity to infection, though closely related, are two distinct conditions. An animal may be inoculated with a given species of bacteria and not suffer, because the bacteria have been killed or could not develop, and yet the animal may be susceptible to the toxins produced by these same bacteria.

TYPHOID SERUM.—William H. Welch believes that at present we have no satisfactory experimental or clinical evidence that the serum will prevent typhoid infection, but that the facts now in our possession are sufficient to encourage a continued trial of this prophylactic agent.

SERUM TREATMENT OF PNEUMONIA.—A. Fanoni [1] has used Pane's antipneumonic serum with marked success in his private practice in eighteen cases of pneumonia, four of which were in children under the age of three years. Of these eighteen cases only one died. This patient, who was seen on the ninth day of his illness and who was in the pre-agonal stage, was given forty cubic centimetres of the serum hypodermically at one dose, without much hope of saving his life. In the four cases of pneumonia in children there was no doubt as to the efficiency of this remedy, as all recovered after a few days' treatment: three or four injections of the serum were sufficient in each case to establish a cure. The fresh serum, when injected early enough and in sufficient quantity (forty cubic centimetres of No. 2 daily), quickly produces a lowering of the temperature, an improvement in the comfort of the patient, and an amelioration of other symptoms. Resolution also tends to take place more rapidly

Alexander Lambert's opinion of this serum is not so favorable as that of Fanoni. He considers its action to be antitoxic, neutralizing the toxin absorbed from the localized focus of infection. It is, therefore, not bactericidal, but bacteriolytic. The serum alone had no effect on virulent cultures of the *Pneumococci*, but when the pneumococcic serum and the leucocytes from immune or non-immune animals were mixed with the cultures the leucocytes in a short time became filled with the germs. For this reason this serum alone could not bring the infective process to a close. Any *Pneumococci* left alive had the power to increase in number and augment the toxin, thus necessitating the use of more and more of the serum. The serum employed was obtained from horses, and would invariably protect when one-tenth of a cubic

[1] Pediatrics, May 15, 1900.

centimetre was mixed with one thousand cubic centimetres of culture and injected subcutaneously, but would only prolong without saving the life of the animal if the cocci were present in the blood. In twelve cases in which he had used this serum nine recovered and three died. The serum seemed to cause a slight reduction in the temperature and improvement in the pulse, but it did not bring on a crisis in any case or cut short the pneumonia. He had not persisted in the use of the serum because he could not see that it shortened the disease or held in check the pneumonic process. It had seemed to do good in one or two cases only. In certain cases, however, it did seem to prevent a general pneumococcic septicæmia.

J. C. Wilson reports twenty cases of croupous pneumonia treated with the antipneumonic serum, with four deaths, and a control test at the same time of a similar number of cases prescribed for in the usual manner. He was obliged to use large doses of the serum before any beneficial effect could be produced, and does not commit himself as to the serum possessing any therapeutic value. The pathological objection to the use of this serum is that all cases of pneumonia are not due to the *Pneumococcus*. Other organisms are capable of producing this disease, and there may often be a mixed infection.

YELLOW FEVER ANTITOXIC SERUM.—Charles B. Fitzpatrick remarks that the serum prepared from the *Bacillus icteroides* had been used on a dozen or more selected cases, and had apparently failed to exert any controlling influence upon the disease. He therefore thinks that the serum therapy of yellow fever is still in the stage of investigation, and one is not warranted in drawing any conclusions other than that the blood serum of the *Bacillus icteroides* of Sanarelli does not cure or modify the disease, and that further observations are necessary.

SERUM CONTAINING MIXTURES OF THE TOXINS OF ERYSIPELAS AND BACILLUS PRODIGIOSUS.—The recent experience of William B. Coley has not caused him to cease using the mixed toxins of *Erysipelas* and *Bacillus prodigiosus*. The initial dose is about half a minim injected into the tumor and repeated daily or on alternate days. If after three or four weeks there is no evidence of improvement, he advises cessation of the injections, although in a few cases they have been continued for three or four consecutive years. Several of the patients are still living eight years after the commencement of the treatment. The effect of this mode of treatment he believes furnishes additional support to the infectious theory of cancer.

ANTIRABIC SERUM.—Robert J. Wilson states that the method of using antirabic serum consists in giving the animal to be immunized seventeen injections in a period of twenty days, and, after twenty-five

days, collecting the serum in the ordinary way. The immunizing dose is one part of the serum for every twenty-five thousand parts of body weight. He thinks the preparation might be useful in those cases in which a long time had elapsed between the infection and the commencement of treatment, but so far this preventive treatment failed completely after the advent of symptoms. The serum, unlike the attenuated virus, conferred its protective action immediately.

ANTISTREPTOCOCCUS SERUM.—H. Lilienthal reports that no case observed by him ever resulted in recovery when *Streptococci* had been clearly demonstrated in the blood, ·although recovery had occurred when *Staphylococci* were the offending germs. Not less than twenty cubic centimetres of the serum should be used. Troublesome urticaria and abscesses containing *Streptococci* had appeared at the site of the injections in a case in which germs had been previously demonstrated by blood-culture, although the serum had been carefully tested and proved sterile. In a case of sepsis with a visible cause the contaminating foci should be drained, and the discharge from the wound, the urinary sediment, and the blood carefully examined for *Streptococci*. If the organisms are found in the urine, serum treatment should be immediately instituted, but, if found in the wound and not in the urine, it·is best to await the blood examination. So far the efficacy of this serum has not been proved; it may be used in any case of bad sepsis, but never to the exclusion of other rational treatment.

SERUM TREATMENT OF DIPHTHERIA.—There seems to be an almost universal consensus of opinion that the essential points in the treatment of diphtheria are to begin the use of the antitoxin as early as possible and to err on the side of too large doses rather than not to give it in sufficient quantity. Some go so far as to state that, so far as we know, there is no limit to the number of units that may be injected. A total of forty thousand units has been reached in some cases without any apparent bad effects.

John Winters Brannan, speaking on this subject, gave the following information as to the use of antitoxin in the Willard Parker Hospital: Unless there was some opposition, antitoxin was given in all cases, the dose being regulated by the severity of the case. If no improvement followed within twenty-four hours, the injection was repeated, and in some cases even given a third time. No patients were admitted to the wards until the clinical diagnosis had been verified by bacteriological examination. In addition to the use of the antitoxin, the vasopharynx was cleaned every two or three hours with a decinormal salt solution allowed to flow from a fountain syringe into one nostril while the patient lay on his side to permit the fluid to escape from the other nos-

tril. The mouth and pharynx and all parts of the throat were treated to this douching. All patients were placed upon stimulating diet and kept in bed until convalescent. Ninety feet of floor space was allowed for each bed. The temperature of the room was kept at about 68° or 70° F. In some cases gavage was used, the tube being introduced through the nostril. For the cardiac weakness whiskey and strychnine were given, the latter being administered with a free hand, a young child sometimes receiving one-tenth of a grain in twenty-four hours; he had never seen the slightest toxic effect from it. Paralytic sequelæ were seldom seen; they were treated by tonics, massage, and faradism. Recently the suprarenal gland had been used; it was spread directly upon the part; it had also been given internally in powder in five-grain doses every two hours. No marked effect had been noticed from its use in the treatment of diphtheria.

W. H. Park has observed that when a minute quantity of diphtheria antitoxin is mixed with a quantity of toxin it completely neutralizes the toxin in about twenty minutes. In the body it neutralizes the diphtheria poison, but does not heal cells already injured by the disease process. Secondary pneumonia and septicæmia come only after the diphtheria prepared the way for such infection. Statistics have made it clear that the death-rate is high in those cases in which the serum is not given until late in the disease. Regarding immunizing injections, he stated that during a period of five years, six thousand five hundred cases had been immunized by the board of health. All patients in whom the disease developed after twenty-four hours and within thirty days recovered, and the only one dying within one month had both scarlet fever and diphtheria. In several the symptoms had been quite distressing for from twenty-four to forty-eight hours, but in no instance had any permanent injury been done.

THE USE OF TUBERCULIN.—Care must be taken to distinguish between tuberculin, a solution containing in addition to the poisons of the tubercle-bacilli a number of other foreign substances, and " T R.," a preparation of the elements which is produced in the cells as the organisms develop. There seems to be a steady increase in the use of these remedies, since their value as diagnostic agents and in the treatment of lupus is undoubted. Petruschky has pointed out the impossibility of curing tuberculosis with a single brief course of treatment with even specific remedies, by reason of the nature of the anatomical lesions of the disease. He is of the opinion that the desired result can be obtained with the aid of tuberculin, and reports twenty-two cases in which the patients were freed of symptoms and did not react to injections of tuberculin, and that the tubercle-bacillus was absent from

the sputum for periods of from six to twelve months. A graduated plan of treatment was pursued, the injections being discontinued with the cessation of the reaction to tuberculin, and being resumed at intervals of three or four months, when it was found that the reaction to tuberculin was again present.

THYROID GLAND.—William H. Howell states that the very gratifying therapeutic results with the extract of the thyroid gland had not been paralleled with the other gland extracts.

OVARIAN EXTRACT.—The hypothesis that the ovaries produce an internal secretion probably accounts for the beneficial effect of ovarian extract in menstrual disorders. After the operation of double ovariotomy no change in metabolic processes had been noted for ten weeks, but since that time a decrease in the daily consumption of oxygen had been observed, which, however, increased after the administration of ovarian extract.

TESTICULAR EXTRACT.—An internal secretion by the testicles is not an assured fact, and, although these organs be removed, the administration of the extract produced no change in oxygen consumption.

THYROID GLAND.—Experimental research shows that the parathyroids, minute bodies found in relation to the thyroid gland, have a function similar in some respects to that of the thyroids proper, but differing in important particulars. Removal of the thyroid gland alone is not followed by death, which, however, does occur after the simultaneous ablation of the parathyroids.

SUPRARENAL GLAND.—From an extended use of the aqueous extract of the suprarenal capsule, W. H. Bates [1] finds this preparation to be the most powerful astringent, hæmostatic, and heart-stimulant known. It is useful in all forms of inflammations and congestions in all parts of the body. The internal dose is five grains placed on the tongue and slowly swallowed without water. For local application a solution is prepared by mixing one part of the dried gland with ten parts of water, and after a few minutes filtering, when the filtrate is ready for use. Schaeffer has suggested that these glands gave to the blood an internal secretion, the active principle of which is probably epinephrin. The secretion is especially abundant in the adrenal vein, and is influenced by stimulation of the splanchnic nerve; it is concerned in maintaining muscular tone especially of the circulatory system.

PANCREATIC GLAND.—Obstruction of the pancreatic duct is followed by marked disturbances of nutrition and a temporary glycosuria, which does not appear after removal of the organ if a small piece be

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[1] International Medical Magazine, December, 1900.

introduced under the skin. It may be supposed, therefore, that normally an internal secretion is present which in some way induces the necessary consumption of sugar. In severe pancreatic diabetes glycogen does not appear in the liver and the glucosuria may be increased by injury to the medulla. Amelioration of the symptoms can be obtained by transplantation of pancreatic tissue.

THE PHYSIOLOGICAL EFFECTS OF EXTRACTS OF DUCTLESS GLANDS.—Richard E. Cunningham has failed to observe the reported results obtained by the use of pituitary gland and suprarenal extract. He objects to the use of desiccated extracts, because of the possibility of their being mixtures of various substances.

THYMUS GLAND.—In exophthalmic goitre the administration of dried thymus gland gave only temporary results. After using the desiccated extract symptoms developed indicative of poisoning by the proteid bodies constituting the impurities. Iodothyrin, he found, could be administered in much larger dose without the production of any such toxæmia.

NEUROLOGY.

BABINSKI'S REFLEX.—Walton and Paul [1] declare that the Babinski reflex, obtained by stroking the sole, and consisting of deliberate and constant extension of the great toe, with or without extension and separation of other toes, is never present in health, and observations raise a doubt of its existence in either functional or organic nervous or other disease not implicating the pyramidal tract. This reflex is often the earliest to appear in pyramidal tract disease,—e.g., at the onset of a hemiplegic attack before the establishment of the exaggerated knee-jerk and ankle-clonus. It may persist during a period when other reflexes are absent,—for instance, when knee-jerk and ankle-clonus are wanting on account of ankylosis, contracture, and muscular wasting, as in long-standing diplegia, or of degenerative sequences as in combined system disease. This reflex furnishes, therefore, a most important practical aid in diagnosis.

THE PALLIATIVE TREATMENT OF PARALYSIS AGITANS.—R. T. Williamson [2] divides the treatment into "general," and that by means

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[1] Journal of Nervous and Mental Disease, June, 1900.
[2] The Practitioner, April, 1900.

of drugs. In the first division he lays great stress upon the patient leading a quiet life, free from all mental excitement and worry, and occupied as much as possible in reading or sewing; curiously enough, it has been found that in women the tremor diminishes during the handling of the needle. Voluntary efforts of the patient and a change in the position of the hands will at times control the tremor. Warm baths are also recommended in especially troublesome cases. Alcoholic beverages and tea and coffee should be abstained from. Hygienic measures are important in the patient's room, and getting into the open air often causes the subsidence of the tremor. The only drug that he has found of real service is the hydrobromate of hyoscine. He gives it in comparatively large doses, beginning with one-one-hundred-and-fiftieth to one-one-hundredth of a grain, in chloroform water, increasing it to one-seventy-fifth of a grain. He states that he has given one-seventy-fifth of a grain two or three times a day, by the mouth, for long periods, without noting any bad effects. Hyoscine not only diminishes the severity of the constant tremor, but also renders the patient more comfortable; it diminishes the general restlessness and uneasiness and the constant desire to change the position which is such a troublesome symptom of the disease. It is important to secure a good night's rest, if possible, and for this purpose a little whiskey and water may be taken at bedtime, or sulphonal may be employed. In this condition also may be given with advantage a large dose of hyoscine at bedtime and a small dose twice during the day. It is important that the bed be not too soft.

THE PATHOLOGY OF THE NERVOUS SYSTEM.—According to Dr. Mott, the starting-point is the nerve-cell, the central nutritional element of the neuron. The peculiar granules revealed in its substance by the method of Nissl he believes to be due to the influence of the hardening substance. When the cells have been stained during life, the granules are invisible, showing that the hardening agent has only increased the contrast between tissues that present a chemical and functional difference during life, which is augmented by the process to which they are subjected after death. These Nissl granules seem to consist of a nucleo-proteid substance, which is precipitated in hardening, and is regarded as lying between the nerve-fibrils which pass through the cell. It seems to be a protoplasmic substance, undoubtedly related to the nucleus and to the cell's vital function. A change in the appearance of these granules and their coalescence attend most important functional alterations, and when they unite, so as to fill the cell with a homogeneously clear mass, the conducting fibrillæ are apparently so far damaged as to be no longer capable of function.

Spiller[1] has shown that when a neuron is injured in any way it suffers alteration in all its parts, although in some cases this may be slight. It has also been shown that a section of the axis-cylinder has an influence on the cell, although far slower and slighter than that on the peripheral part of the nerve. Spiller reports a case where chromatolysis was found in the nerve-cells of the lower part of the cord after a hip-joint amputation. After experimental division of the nerve-fibre the protoplasmic granules, which stain so readily, no longer remain distinct, and the nucleus is displaced towards the periphery of the cells. If recovery follows, after the nerve-fibre has regenerated, the cell increases in size, the staining material resumes a more natural appearance, and the nucleus regains its central position, and ultimately the normal aspect. The enlargement of the cell is regarded as evidence of physiological activity connected with the increased trophic energy. If the damage to the nerve is too severe to be recovered from, progressive changes occur in the proximal part of the fibre, with diminution of the myelin and ultimately changes in the axis-cylinder, and the alterations in the nerve-cell, instead of diminishing, progress to atrophy.

Dr. Mott's observations on the appearance of the nerve-cells in the brain in experimental anæmia, relieved quickly by the collateral circulation, are of considerable interest. He finds that the transient disturbance of function is associated with swelling in the cells, an alteration in the staining of the Nissl granules, and a displacement of the nucleus towards the periphery of the cell, which may proceed to its extrusion and the death of the cell. The amount of destructive change can be traced by the subsequent degeneration of fibres in the spinal cord. The slighter alterations gradually pass away if the circulation is established soon enough.

The influence of one neuron upon another is of interest. Spiller was unable to find atrophy of the cells of the anterior horn of the cord on the side of the degenerated pyramidal tract in hemiplegia either of cerebral or of spinal origin; even in cases of compression of the cervicothoracic cord in early life, in which the cells of Clarke's columns had disappeared, the cells of the anterior horn were not distinctly diseased.

Two neurons in connection with one another do not degenerate to the same degree and with the same rapidity from one lesion. A difference in structure appears to exist at the point where two neurons come together, and the essential elements of one neuron evidently are not the same as the essential elements of another.

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[1] Twenty-sixth Annual Meeting of the American Neurological Society.

Another instructive subject is the influence of temperature on the nerve-cells. Their condition in cases of hyperpyrexia in the human subject shows a remarkable correspondence to the condition found in animals that have been exposed to heat. In proportion to the degree and duration of the temperature, there is the same influence on the Nissl granules above mentioned, indicating a profound alteration in the protoplasmic constitution of the cell. In man, however, the conditions found may be sometimes in part ascribed to the toxic agent which causes the high temperature. A slighter degree of pyrexia for a long period causes the same change as a high temperature for a short time. Moreover, it has been found that a slight degree of the change induced by hyperthermia is compatible with recovery, and Dr. Mott suggests that this may indicate a mode in which the cold bath exerts its beneficial influence by reducing the temperature before its effects have continued so long as to preclude recovery.

The special selective influence of toxic agents on certain parts of the nervous system is a familiar and special feature of their action, of which Dr. Mott gives many illustrations. A striking instance of the difference in selective action which is caused by a most trifling difference in chemical composition is the discovery of Dr. Waller that the difference of a molecule of water determines the action of one poison—veratrin—on the muscle or on the nerve. One of the best instances of local influence is afforded by the poison of tetanus. The affinity of this for nervous matter is directly shown by the fact that it loses much of its poisonous power if previously made into an emulsion with nerve substance. There is much discrepancy of observation regarding the occurrence of changes in the nerve-cells of the spinal cord after death from tetanus toxin, a fact which may find its explanation in the chief action of the poison on the extremities of the dendrites. Another practical point in the chemistry of nerve degeneration which Dr. Mott brings forward is the probability that some of the symptoms in disease attended with rapid nerve degeneration are due to the toxic influence of the products of the nerve-tissues themselves. Choline, which seems to be a normal product of the metabolic changes of the nerve-structures and passes out of the system probably as urea, is found in general paralysis in amounts large enough to cause its characteristic effect of lowering the blood-pressure. Another product, neurine, which is thought to be sometimes produced in degeneration, has highly toxic qualities. The amount of proteid matter in the cerebrospinal fluid in general paralysis is three times the normal. The loss of the reflex action of the iris to light has been frequently observed in general paralysis, and some instances are given of per-

forating ulcer of the foot and of tabetic arthropathy in this malady. Tabes and general paralysis may be regarded as really one disease, affecting in some cases the neurons which associate different parts of the central and frontal convolutions, and in others the neurons of the posterior ganglia of the cord.

TREATMENT OF CEREBELLAR TUMORS.—Batten[1] believes that after the situation of the tumor has been ascertained there are many points to be considered before attempting to remove it. There can be no doubt that operations for the removal of large tumors in children involve serious risk to life, from the great disturbance of intracranial pressure that takes place. On the other hand, if the symptoms are progressive and the sight is well preserved, the child will be given the best chance of recovery by removal of the tumor. There are, however, many difficulties, for it is almost impossible to decide whether the tumor is incapsulated or infiltrating, and in the latter instance no good could result from the attempt to remove it. Three-fourths of the tumors of the cerebellum in children are tuberculous; and, apart from the fact that this form of growth frequently tends to become quiescent, the interference with such a tumor renders the patient especially liable to the onset of tuberculous meningitis. With regard to the eyesight, the opening of the skull will often to a very considerable extent preserve vision which would otherwise have been completely lost; therefore, in any case of cerebral tumor, even though it cannot be accurately localized, it is well to consider the advisability of opening the skull, simply with the hope of saving the eyesight. If headache and optic neuritis are present, these symptoms may be palliated by inunctions of mercury and large doses of iodide of potassium. In two cases this treatment was followed by successful results.

INJURY OF THE SPINAL CORD.—Kienböck[2] showed a man, aged forty-five years, who two years previously fell from a height, striking on his buttocks. He did not lose consciousness, but was lame for some time, and it was two months before he recovered so as to be able to walk about as formerly. The intestinal and urinary lesion remained irreparable. From the time of the injury the catheter had to be used and the bladder irrigated; at present incontinence exists. The bowels have to be cleared out by injections; "cold paræsthesia" is present over the buttocks, the perineum, and on the inner side of the upper part of the legs. Between the first and second lumbar

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[1] Physician and Surgeon, March 22, 1900.
[2] Medical Press and Circular, March 21, 1900.

vertebræ there is a space which indicates a fracture of the spinal cord, which seems to be confined to the conus medullæ spinalis, as the symptoms—the symmetry, the absence of irritation phenomena, and a gradual reduction of the sensation in the surroundings—are against a caudal lesion. No hope of further improvement can be offered, neither is the case likely to grow worse.

TREATMENT OF THE PAINS OF TABES DORSALIS.—For the relief of the pains of tabes dorsalis Taylor [1] regards phenacetin and antipyrin, migrainin, and the other analgesics as very important. He has never yet found it necessary to give morphine for the lightning pains of the tabes, but has been able to relieve them by the use of the other drugs mentioned and similar ones. Some may think that Dr. Taylor's statement about the use of morphine does not, unfortunately, apply to all cases, especially to that atrocious disease " tabes" dolorosa.

TORTICOLLIS AND ITS TREATMENT.—Wilkin [2] relates the case of a man, aged thirty-three years, for whom various methods of external and internal treatment had been tried without benfit. He was then treated by suspension and by the internal use of eighteen-grain doses of valerianate of zinc. The treatment was aided by allowing him considerable freedom and a liberal diet, and placing him in a private room instead of in a hospital ward. Subsequently he experienced great relief from the use of one grain of exalgin three times daily. The prompt improvement that followed the use of suspension was almost marvellous.

INSOMNIA.—Bradbury [3] states that for ordinary cases of sleeplessness simple means very often suffice. Some people read themselves to sleep, some count; others, like Southey, think of some monotonous discourse. Walking about naked is often useful. Massage, especially of the abdomen, thighs, and legs, as in Dr. Eccles's method of treating insomnia, is sometimes advantageous. This method is believed to produce temporary anæmia of the brain by causing a determination of blood to the manipulated parts, and it may be aided by a hot compress to the abdomen. In the case of cold feet vigorous rubbing or a hot bottle or a hot foot-bath with mustard in it is beneficial, or a hot sitz-bath may be tried. Attention should also be given to the work of the stomach. As a rule, a light supper is the best; and for many, and especially those who wake in the middle of the night, a little hot milk or meat-juice containing a small amount of alcohol

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[1] The Practitioner, June, 1900.
[2] Journal of Nervous and Mental Disease, May, 1900.
[3] Practitioner, January, 1900.

is helpful. The evacuations should also be attended to, and the bladder especially should be relieved. Sleeplessness from overwork, especially from literary work, requires mental rest and change of air and scene. Temporary exposure to the cold air of the bedroom, or a wet pack, or a bath is often of use. If the insomnia continues, it is necessary to give a mild hypnotic, such as twenty grains of sulphonal or trional, or thirty or forty grains of bromide of potassium, to break the habit of sleeplessness. Capsules containing thirty minims of turpentine given at bedtime are sometimes beneficial in the insomnia of overwork and worry. The drug acts as a stimulant and derivative, and is stated to succeed best in plethoric cases. No beverages containing caffeine should be taken after breakfast.

Broadbent [1] believes that the most common cause of sleeplessness is indigestion, especially with gaseous distention of the stomach when its muscular walls are atonic. It is highly characteristic of this form of insomnia that the patient is aroused from sleep, into which he falls on getting into bed, at a certain hour every night or early morning, owing to distention of the stomach, and then remains awake. The treatment is that of dyspepsia, with, in addition, a glass of hot water before undressing for about a week, or an alkaline carminative draught, carbonate and sulphocarbolate of sodium with aromatic spirits of ammonium, compound tincture of chloroform, or ether and peppermint water, or camphor water, and sometimes bromide of sodium, or ammonium, or sal volatile and carbonate of sodium. Benefit may be derived from friction over the epigastrium or between the shoulders. The stomach may be washed out. Strong tea and coffee may give rise to sleeplessness if taken on going to bed, but if they are taken during the afternoon it is more likely that flatulent dyspepsia is the real cause of the trouble.

TRAUMATIC HEMORRHAGES INTO THE SPINAL CORD.—Bailey states that no one who has to do with injuries of the nervous system will question the importance, from a clinical, pathological, and legal standpoint, of traumatic hemorrhages into the spinal cord. "Traumatic hemorrhages in the substance of the spinal cord occur in two ways,—first, as complications of general crushes and mutilations due to fractures and dislocations of the spine; this I have called secondary hæmatomyelia. The other and more important variety I have called primary hæmatomyelia, as it results from force directly upon the cord itself without the intervention of pressure by bone or cartilage." In the presence of an injury to the spinal cord, when bullet and other pene-

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[1] F. L. Wood's abstract in the Medical Chronicle, March, 1900.

FIG. 1.—Attitude in the case of a partial lesion of the spinal cord, due to injury of the cervical vertebræ.
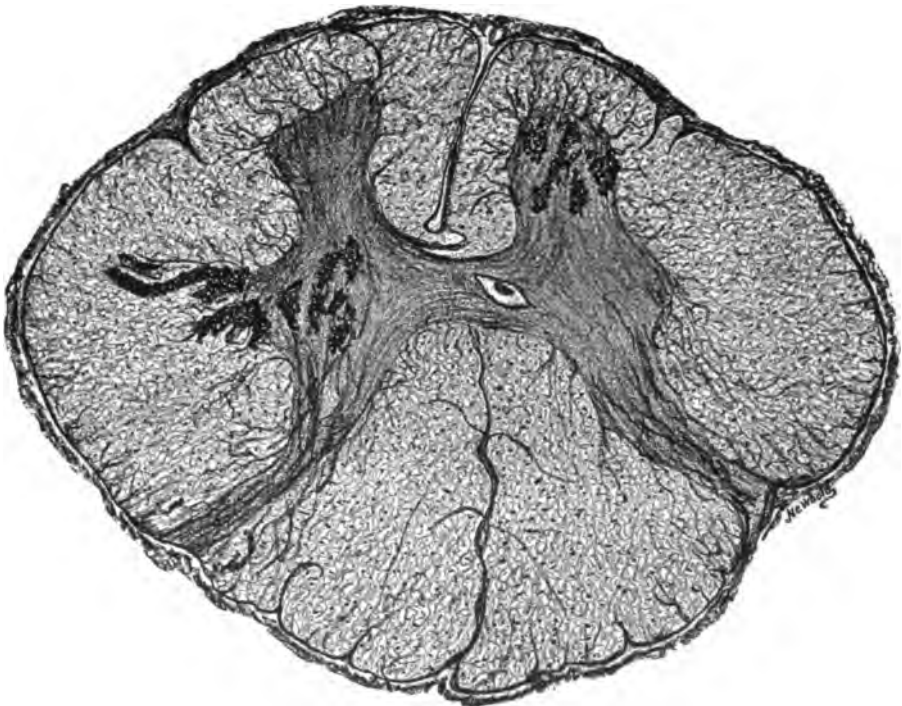
FIG. 2.—Small hemorrhages in the first thoracic segment of the spinal cord, following a severe general traumatism. Spinal column uninjured.
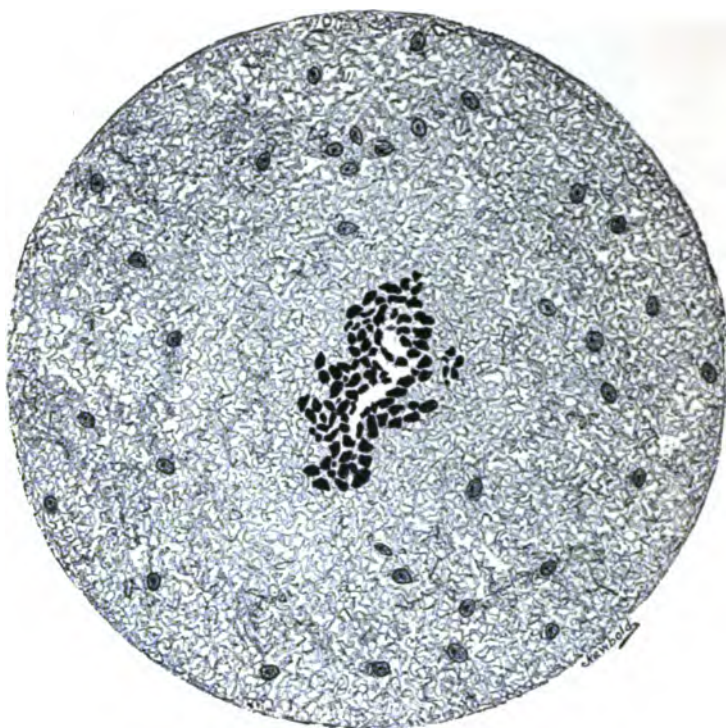
FIG. 3.—Small hemorrhage in the spinal cord.   No inflammatory or degenerative reaction.
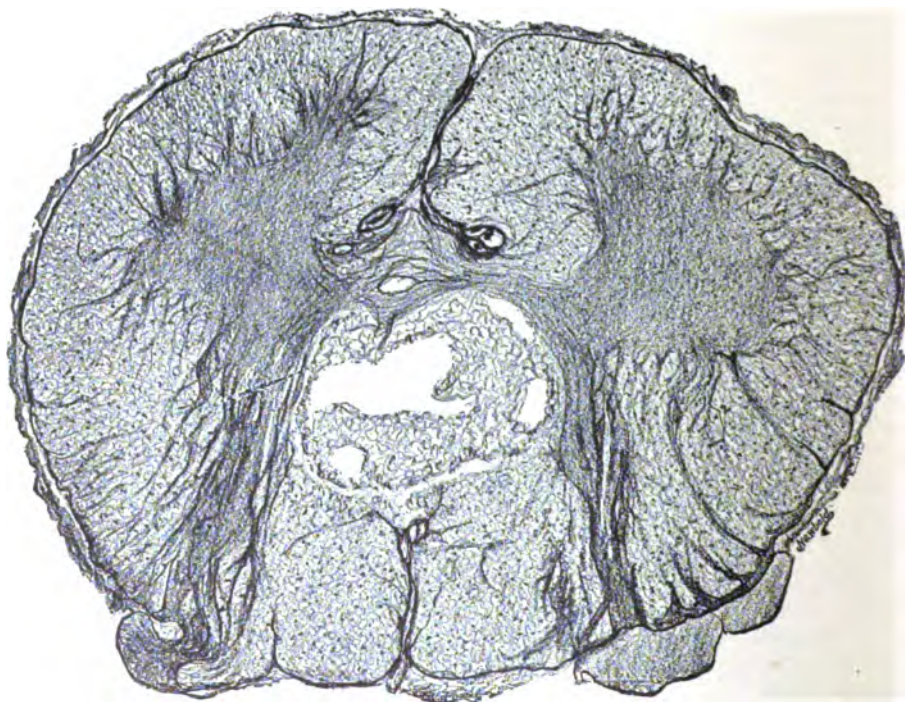
FIG. 4.—Showing cavity formation in the spinal cord as the result of hemorrhage.

trating wounds can be excluded, three possibilities present themselves. These are (1) pressure from displaced or broken-down protecting structures, (2) pressure from blood poured out within the spinal cord, and (3) primary hæmatomyelia.

The first class comprises the common fractures and dislocations of the spine. The resulting mutilation of the cord is extensive, the symptoms are wide-spread, and the prognosis is always gloomy for the restoration of function. In such injuries hemorrhage occupies a place of varying prominence. It may be extremely slight or absent, or capillary extravasations in the vicinity of the most severe lesion may be found scattered throughout, especially segments above and below the affected area. In still other cases the blood makes it way into the gray matter in pencils up and down the cord, even for long distances. It is to this latter condition that van Gieson has applied the name hæmatomyelapore.

When making the diagnosis of partial lesions resulting from external pressure it should be remembered that the symptoms are chiefly due to pressure exerted upon the outside of the cord,—that is, pressure along afferent and efferent tracts rather than upon the central gray matter. Since hemorrhage has a predilection for the central parts of the cord, a small focal hemorrhage within the cord's substance produces a very different clinical result. The primary hæmatomyelia may cause symptoms in the upper extremities while the lower extremities are unaffected. The dissociated type of anæsthesia also is, as far as our present knowledge goes, distinctly characteristic of a gray matter or central affection. Finally, lesions due to compression from without the cord, are, as a rule, richer in symptoms than purely hemorrhagic ones. There is usually impairment of both sensation and motion in extended areas. The bladder rarely escapes involvement.

The second class, hemorrhage between the cord and vertebræ, has received much more attention from clinicians than it seems entitled to from post-mortem findings. If it occurs as a distinct and isolated pathological entity, there are no reliable means of recognizing it during life and it is never met with as an isolated lesion. It is invariably associated with far more important injuries,—with crushes or intraspinal hemorrhage,—which give the clinical stamp to the case. This extramedullary hemorrhage is sometimes given in explanation of the characteristic symptom known as diplegia spinalis brachialis traumatica.

The third variety of spinal-cord injury—traumatic hæmatomyelia—is relatively frequent, but its special clinical importance results from its favorable prognosis. In twenty-one cases of spinal-cord trauma-

tisms examined by Thurburn, six were interpreted as examples of primary hæmatomyelia. Of seven cases of general injury examined by Parkin, one was primary hæmatomyelia. Of Stotper's twenty-two autopsies on various spinal-cord injuries, two were primary hæmatomyelia. The situation of the hemorrhage is usually in the gray matter. This is explained by the gray matter being more highly vascular and by its having more supporting tissue than have other parts of the cord. When the hemorrhage is extensive, it may burst through the gray matter into surrounding areas. The ventral and dorsal horns are the favorite seats. The gray commissure often escapes, and it is unusual for it to be involved in the immediate vicinity of the central cord. The white matter may be involved by the blood passing the limits of the neighboring gray. Large hemorrhages into the white matter are most frequently found in the dorsal columns just behind the gray commissure. In some of the reported cases the cord at the affected level has been completely hollowed out by the blood-clot; surrounding this clot there may be an area of softening. In others it is extremely small and more marked on one side than on the other. Localized collections of hemorrhage from injury are found much more frequently in the regions of the cord subjacent to the lower cervical vertebræ,— that is, in the region of the greatest spinal movements. It is probable also that primary traumatic hæmatomyelia occurs in the lower lumbar regions and in the conus medullaris. In the majority of cases of hemorrhage in these regions, there have been serious lesions in the bones.

In contrast to this type of hæmatomyelia is another, the disseminated type, in which there are extravasations throughout the entire spinal axis. This is a variety of hæmatomyelia which has been much speculated upon as affording an anatomical foundation for the traumatic neurosis. It has been found at autopsies on infants born in prolonged and difficult labor, but with the exception of a case described by the author he has found no pathological record of it in traumatic cases in adults. The hemorrhage may be large, small, or disseminated.[1] The appended illustrations (Figs. 1 to 8) show the most striking features of traumatic hemorrhages into the spinal cord.

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[1] The article from which the above abstract is taken and the illustrations appeared in the *New York Medical Record* of April 7, 1900.
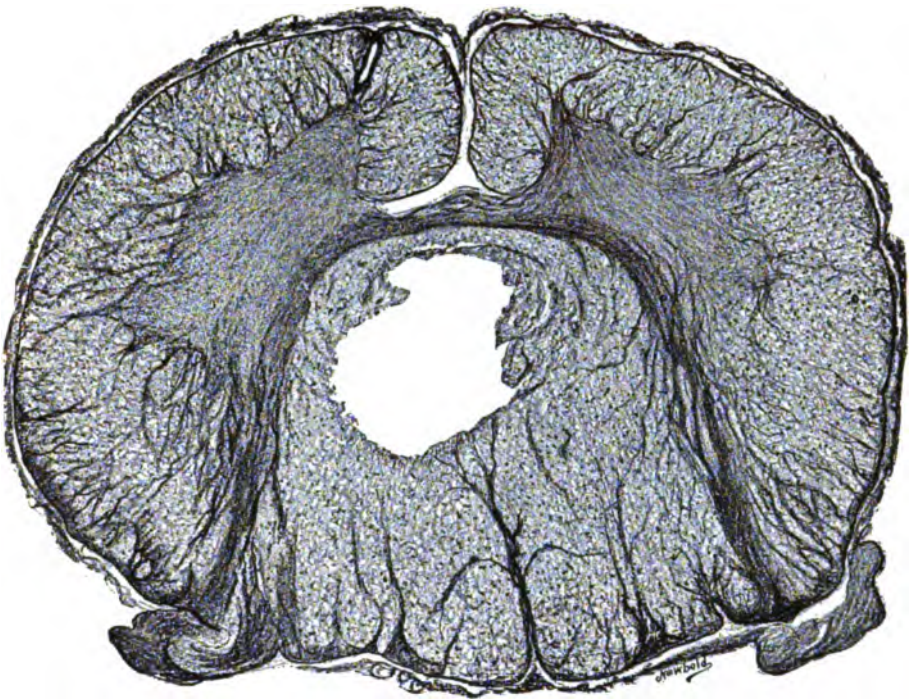
FIG. 5.—Showing cavity formation in the spinal cord as the result of hemorrhage.
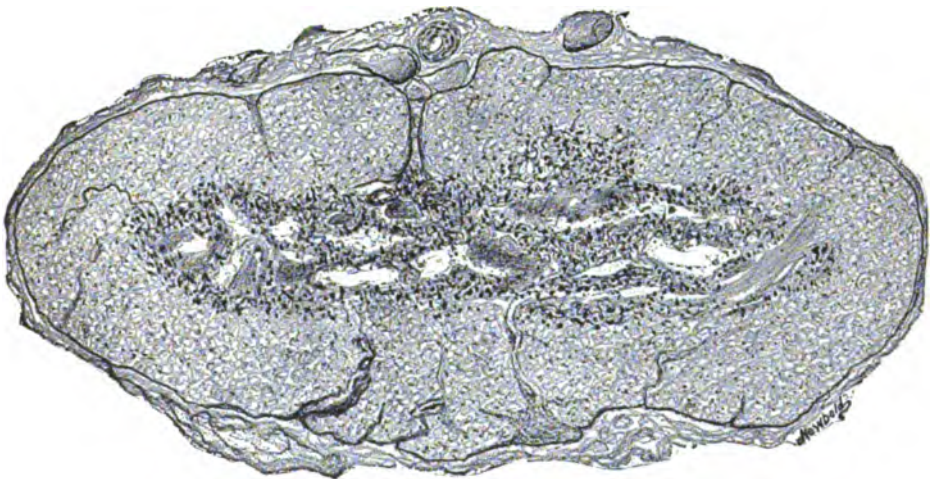
FIG. 6.—Showing late results of cavity formation.   The central parts of the cord, into which
hemorrhage had taken place, are filled up with new connective tissue.
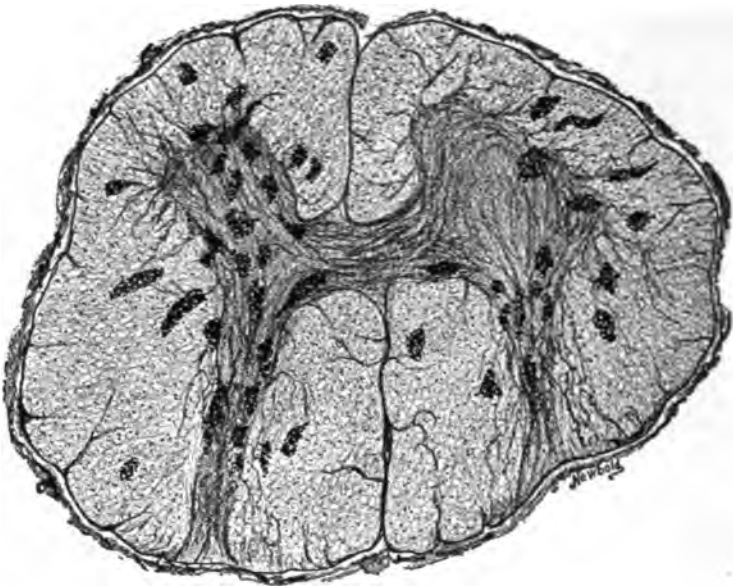
FIG. 7.—Disseminated hemorrhage into the spinal cord from injury.
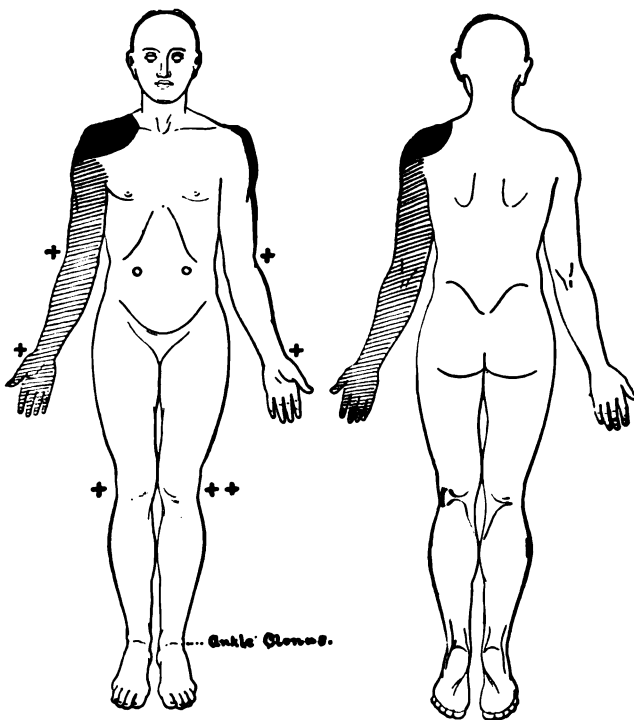
FIG. 8.—Diagrammatic representation of the anæsthesia and the condition of reflex activity, in a case of primary focal hæmatomyelia from injury.

SURGERY.

MODERN BULLET WOUNDS.

THE modern projectile bores a small clean hole right through the part, and the aperture of exit can scarcely, if at all, be distinguished from that of the entrance. The wounds are usually aseptic and heal rapidly under a simple antiseptic dressing. When only the soft parts of a limb are perforated and no important vessels have been torn, the shock at the time of the infliction of the injury is but slight and recovery is rapid and complete. Sir William MacCormac cites a case where a Mauser bullet traversed both thighs, passing in front of one femur and behind another. There was very little hemorrahge, and the man was able to run eight hundred yards after receiving the injury. A bullet may even make a clean hole through a bone without any or with very little splintering. This naturally occurs more frequently in the flat bones, such as the scapula, than in the long bones. In one of the cases reported the shot passed through the left ilium just below the crest and emerged a little more than an inch below the ensiform cartilage. From the situation of the apertures of entrance and exit, and remembering that a Mauser bullet passes straight from one to the other, turning neither to the right nor to the left, we are justified in thinking that the ball must have pierced the stomach; but no symptoms of any such injury appeared. The patient took his food from the beginning without any inconvenience and had a rapid and uneventful recovery. In yet another instance, from the situation of the wounds and from the fact that a most obstinate constipation followed the injury, it is almost certain that the colon was perforated, yet no peritonitis arose. Not the least remarkable of the effects of the Mauser bullet is the very slight hemorrhage resulting from perforation of the lung. There is generally a little hæmoptysis, which soon ceases and convalescence ensues. Even when a comminuted fracture of a bone of a limb has been produced, complete consolidation thereof may result, though the fracture was necessarily compound. A striking case of perforation of a joint shows that only a slight synovitis may follow. This is in marked contrast to the havoc produced by a large bullet. These results must produce a feeling of hopefulness in the treatment of modern bullet wounds, for they show that in many cases a temporary interference with military service is all that is produced.

In an address on "The Wounded in the Present War,"[1] Sir William MacCormac says, "As there are as yet but few statistical returns available, it is not possible to formulate any precise conclusions, and the most exact analysis of the results of gunshot injuries similar to those inflicted in the present war is to be found in a communication made by Professor Nancrede, of the University of Michigan, to the last meeting of the American Surgical Association. In this interesting paper he discusses the outcome of fifteen hundred cases of gunshot wounds he had himself observed during the war in Cuba in 1898. These were inflicted by Mauser and Krag-Jorgensen bullets, and the conclusions he arrives at strikingly resemble my own. In general character the Lee-Metford and Mauser wounds,—for there is no essential difference between them,—as compared with those I have seen before, are extraordinarily mild. An uncomplicated flesh wound in any part of the body heals very rapidly and usually occasions the most trifling amount of inconvenience, and all wounds of the chest and abdomen and of joints, as well as gunshot fractures of the bones, are recovered from in a manner which previously would not have been considered possible. This favorable result depends in the foremost place, in my opinion, on the small size of the projectile and on its high velocity and aseptic character. The nature of the injury is rather that of an incised than a contused or lacerated wound; the openings of entrance and exit are very small and tend very rapidly to close up. The absence of explosive effects and the great infrequency with which articles of clothing or any foreign material are carried into the tissues, are noteworthy.

"None of that appalling destructiveness attributed to the new projectile which experiment on the dead body and on animals appeared to forecast was seen. Nor was this feature witnessed in the Cuban war, where the wounds presented precisely similar features and healed with the same facility as they did in South Africa, not only flesh wounds, but cases of fracture and of injuries involving all the great visceral cavities.

"To operate in those cases where the abdomen was without doubt traversed by a bullet, and where the sufferer seemed in a fit condition to be operated upon, used to be the best rule. This opinion, however, must be changed. I believe I have seen more than fifty cases of injury of this kind recover without interference beyond antiseptic occlusion, and in many instances not even that was accomplished. We know that

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[1] Delivered before the Royal Medical and Chirurgical Society, May 22, 1900.

comparatively few cases recovered after an operation during this war, and none, it is stated by Nancrede, recovered after operation during the Cuban war. I know of at least one case in which it may be fairly urged that recovery took place in spite of operation. It was that of a young man shot at a distance of eight hundred yards by a Lee-Metford bullet, which passed through the cæcum. The projectile entered from behind through the right sacro-iliac synchondrosis, and emerged in front half-way between the right anterior superior iliac spine and the ninth costal cartilage. The abdomen was opened eight hours after, but the greatest difficulty was experienced in finding the intestinal wound. There was no sign of extravasation, and the seat of injury was only discovered after much handling and squeezing of the bowel. The openings were readily closed by a couple of Lembert's sutures, the abdomen was washed out, and the patient recovered. I have no doubt that this man would have recovered without surgical interference, and other cases bearing on this point might be quoted.

"I think the rule in the future must be to give patients so wounded a chance of recovery without operation. Evidence of serious hemorrhage or of commencing peritonitis would indicate operation.

"Nancrede goes so far as to say that an operation will too often determine the death of some patients who might otherwise have recovered, and this I believe is only too likely to happen. He has further stated that all the cases operated upon during the Cuban war died, while he saw a number who had recovered without operation, and in the report of the Surgeon-General of the United States of America, it is recorded that of forty-four penetrating abdominal wounds thirty died, and that operative interference was only resorted to in four of them. I can only explain this considerable immunity, which I believe was much greater in our own army, by the frequently empty state of the intestinal tract at the time of injury, the smallness of the aperture made in the bowel by the ball, its tendency to glue up or close up by adhesions without extravasation, and the early application of an antiseptic first dressing.

"In the case of chest wounds the principle of non-interference and antiseptic occlusion may be most strongly affirmed. A large proportion of these cases recovered, often without noteworthy symptoms. In one instance I knew a man to run eight hundred yards after being shot through the chest. A Boer shot through the lung smoked his pipe comfortably the next day, and on the following one insisted on going home to his wife.

"During the Cuban war, the Surgeon-General of the United States

of America states that there were fifty-three penetrating wounds of the thorax and that thirty of the men so injured returned to duty.

"There has not been the free bleeding that was expected. Hæmothorax occurred occasionally, and when urgent was, as a rule, permanently relieved by tapping. In a few empyema took place. In the Franco-German war the heavy bullets then employed caused a deathrate, exclusive of killed, of from fifty to sixty per cent., and hemorrhage and empyema were very frequent. Nancrede mentions a case of recovery in which it was believed the heart had been traversed. I have seen three instances in which it was impossible to understand how the heart could have escaped unless the bullet were deflected, who nevertheless made a good recovery.

"Uncomplicated gunshot fractures, even of the femur, rarely require amputation. A few amputations have been performed when complications arose, generally gangrene arising from arterial damage or because of septic infection, and some cases have gone wrong on account of prolonged transport, which is the worst thing that can happen to a fractured femur. If we take gunshot injury of the joints, and consider the injury of the knee-joint as an example, there can be no doubt that antiseptic occlusion should always be practised in the first instance unless there be some very serious complication. I have seen a large number of cases recover with free joint movement. In a few there has been some delay in recovery because of hæmarthron, but I do not recall any case in which amputation was performed for a simple perforating wound of the knee. Septic infection may, of course, have taken place in some cases, of which I do not happen to have heard, and an operation have been needful in consequence.

"There have been very few formal resections practised. I only saw one. It was in a German ambulance at Jacobsdal, and the result did not promise well.

"The number of lodged bullets is considerable, and this is a surprising and unexpected result, especially when we consider that the muzzle velocity of the ball is about fifteen hundred miles an hour. Nancrede estimates lodgement as occurring in ten or fifteen per cent., and I should think it was even greater. What, then, ought to be done in cases of lodgement of the projectile? It should be mentioned that, as a rule, a skiagram is taken in all cases of lodged projectiles and of fractures; but the radiograph affords no certain guide, although, as a rule, it gives great assistance; it may be difficult to interpret and on some occasions fails to serve. If the bullet be causing irritation, producing pain, or is likely from its position to be a source of future disturbance, certainly let it be excised, if this can be done without

undue risk. But in many cases it causes no inconvenience, and I feel sure that in these it should be left alone, unless perhaps when lying immediately beneath the skin. John Hunter urged this view, and so have many others.

" I have known two cases where death from hemorrhage followed ineffective and protracted attempts to remove a projectile. I was recently present at another case of attempted removal of a bullet which had apparently been exactly localized by the X-rays. The bullet was not found, and the operation had to be abandoned on account of the very evident risk which further search would entail, and the pleural sac narrowly escaped being incised."

As to the position of female nurses at the seat of war Sir William believes that the place for women is in the hospitals, and that they should never be permitted to pass within the zone of fire.

" The aspiration that war might be made impossible by reason of the frightful wounds which modern weapons would produce and their devastating influence finds no realization in the results of the present campaign. Modern artillery is considered to have been enormously strengthened and improved, yet its destructive effects compared with rifle fire are limited. Of the whole number of wounded up to the present time twenty-seven per cent. were damaged by shell fire and seventy-three per cent. by rifle fire. This even is a larger proportion than usual. At Colenso there was a two days' bombardment and five Boers were killed. The German Boer Artillery Commandant Albrecht estimates that for every thousand shells we fired the Boers lost the insignificant number of twelve killed and forty wounded. At Paardeberg a most terrible and incessant shell fire was continued during ten days. There were one hundred and twenty guns hurling tons of metal at the four thousand Boers there, one gun for every thirty-three Boers. Yet the casualties were insignificant, one calculation putting them at one man for each gun.

" I venture to believe that never before has there been a larger proportion of recoveries and return to duty after gunshot wound than during the present campaign. Never before have injuries to what we consider vital structures and organs been recovered from as they have been now. Up to May 12 the total number of wounded officers and men in the campaign was ten thousand seven hundred and one. The deaths were five hundred and seventy-one, or 5.34 per cent., which is, I think, very small. It is noteworthy that the death-rate among seven hundred and forty-eight officers wounded was two and one-half per cent. greater than among the nine thousand nine hundred and fifty-three men. Their injuries were possibly more severe. Among

the invalids from South Africa admitted to the Netley and Woolwich hospitals there were ninety-two cases of knee-joint injury (twenty-eight of these were discharged as fit for duty), one hundred and fifty-four cases of chest-wound (seventy-three discharged fit for duty), and fifty-six cases of abdominal wound (twenty-six discharged fit for duty). Three knee cases, five chest cases, and three abdominal cases have been invalided out of the service. The final results in the remainder are as yet undetermined, but many of them are on sick furlough and will presumably be eventually sent back to duty."

Added to the remarks of Sir William MacCormac, we have the testimony of Mr. Frederick Treves, who says, in substance, that the very remarkable effects which could be produced by a modern bullet are well illustrated by a Lee-Metford cartridge which had been pierced, while in the belt of a British soldier, by a Mauser bullet, which then entered the man's abdomen and passed out at his buttock without producing any symptoms whatever. Mr. Treves had met with many cases of nerve-trunks pierced and bones perforated, as if with a small gimlet, by Mauser bullets. In one case the ball pierced the middle phalanx of both the ring and little fingers, and yet the patient recovered with a practically perfect hand. There were many statements in current text-books which were not borne out by the experience of the present war. For instance it was commonly asserted that the mechanical power of a bullet was represented by the product of mass into the square of velocity; and it followed from this that the question of range was the all-important one. But this formula could now be proved to be wrong.

Turning to the subject of the explosive effects of bullets, he said that there was no such thing as a really explosive bullet, but, if the end was uncovered, it splintered and pulverized the bones. In this way funnel-shaped wounds were produced, the entrance hole being small and circular and the exit large and jagged. The production of such a wound was not a question of range, though Mr. Treves felt bound to say that the wounds he had seen produced at undoubtedly short ranges had been mostly clear and round.

Some of the lay papers had asserted that poisoned bullets were in use among the Boers, and some which Mr. Treves had found had evidently been dipped in something that imparted to them a bright-green color. It had been suggested that this was verdigris, but analysis showed it to consist of paraffin, the color being due to oxide of nickel derived from the shell of the bullet. The paraffin was used to prevent the barrel from fouling.

MEDULLARY NARCOSIS.

L. Marcus,[1] in discussing this method of anæsthesia, which is engrossing the attention of the entire profession, states that it appears to him to have taken a permanent place as a valuable therapeutic agent.

" J. Leonard Corning, of New York, in 1885, is the first gentleman to record spinal anæsthesia; he reports his experiments tried on a dog and the human subject. In this his first report he claims that it is unnecessary to inject the medication into the spinal cord, stating " that in the human subject numerous small veins (venæ spinosæ) run down between the spinous processes of the vertebræ, and, entering the spinal canal, join the more considerable vessels of the plexus spinalis interna;" that by this arrangement of the circulation the cocainization of the cord would be obtained.

The utility of this method so impressed Corning that he continued his experiments and widened its field of application in neurology, reporting his results in 1888. He described his technique and gave illustrations of a trocar and needle for this special method. It appears, though he was not aware of it, that all of his injections that were followed by a favorable result must have been made into the spinal canal; as Marx has shown that when the cocaine solution is injected around the cord, the phenomena of anæsthesia or the symptoms of post-operative insults are not obtained.

It is in his work on " Pain" that he records the definite results, for which I believe he should receive the credit of being the first to try medullary narcosis for therapeutic purposes, and of opening up the field for the possibilities of operating in or upon the analgesic areas.

In the chapter headed " Local Medication of the Spinal Cord" he carefully weighs the possibility of danger following lumbar puncture, saying, " As to the question of possible injury arising from pricking the filaments of the cauda with the needle, it must be borne in mind, in the first place, that serious disturbances of sensation and motility, having their origin in the cauda, are always due to gross lesions, and not to insignificant circumscribed causes." The very fact that the cauda is composed of a great number of filaments, that these fill out the entire canal and are widely distributed, would a priori lead us inevitably to this conclusion, did we not know, from clinical histories and subsequent post-mortem investigation, that such is the case. Secondly, we must remember that the wounding of a nerve-

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[1] Medical Record, December 13, 1900.

stem (and the cauda is nothing more than an aggregation of nerve-stems) with a fine sharp needle is practically without significance. There is an interesting observation bearing on this point in Weir Mitchell's well-known book on nerve injuries, which we may here apply with perfect legitimacy. "The passage of a needle into the nerve of an animal causes," he says, "usually a little bleeding, which passes away without grave results. Such a statement applies to simple puncture with a fine needle. Wounds made with an awl or other coarse instrument may, of course, set up the symptoms of circumscribed neuritis." This removes all fear of immediate or remote injuries referable to a puncture made below the limits of the true spinal cord.

The *modus operandi,* as Corning himself describes it,[1] is briefly as follows:

"(1) The needle may be from three and a half to four inches in length. It should be fine, but not over-tempered. The bevel of the point should be short, so that the needle will not require to penetrate the membranes very far in order to insure the deposit of the solution within them. The needle may be made of gold or platinum, which are not liable to break, even when the calibre is small. There should be a small steel nut, transfixed by the needle, sliding freely upon it, and fixable at any point of its (the needle's) length by the aid of a small set-screw.

"When the needle is pushed in slowly in the space between the fourth and fifth spinous processes, a few drops of cerebro-spinal fluid should emerge before injecting the anæsthetic. If this is not successful, thrust the needle down to the point of the spinous process to measure the distance between the latter and the surface of the skin. To this add four centimetres, taking the measurement from the posterior wall of the canal; then add one-half centimetre for the slight inclination of the needle. Thrust in slowly, inject a little of the anæsthetic, and wait for anæsthesia. If after a lapse of ten minutes there is neither tingling nor numbness, inject a few more drops. In this way frequently anæsthesia is obtained. The patient should be preferably in the sitting posture.

"(2) The syringe should be glass, graduated up to thirty minims or more, and provided with asbestos packing.

"(3) I prefer a short, delicate trocar half an inch in length, to penetrate the thick skin of the back, subsequently passing the needle through the opening in the trocar.

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[1] New York Medical Record, October 20, 1900.

" (4) Thoroughly sterilize the instruments and render the skin sterile.

" (5) For the anæsthetic, use ten to fifteen minims of a two-per cent. cocaine solution which has been sterilized by boiling.

" (6) For feeble heart action use small doses of strychnine, nitroglycerin, or digitalis hypodermically."

An editorial in the *Medical Record* says that Carl H. Anderson has reported six cases of operation under this anæsthetic, with one death from pulmonary embolism. He speaks of the difficulty attending the sterilization of cocaine, and urges practitioners to be exceedingly cautious in employing lumbar puncture, as he considers it a serious operation. Moyer advocates the use of beta-eucaine, four per cent. solution, as a substitute for cocaine on account of its safety. It is about one-third as toxic as cocaine, and one-half as anæsthetic, but it can be absolutely sterilized.

ANEURISM.

LIGATURE OF THE ABDOMINAL AORTA.—W. W. Keen reports [1] a case of ligature of the abdominal aorta just below the diaphragm, the patient surviving for forty-eight days. After giving a most interesting account of his case and those of others previously reported, he says that the first question which presented itself to him was whether the ligature had not slipped and failed wholly to occlude the aorta, as actually occurred in the able hands of Professor Tillaux. "This was especially suggested to me by the large loop which the ligature showed, as revealed by the necropsy. In order to determine this positively, I removed the loop of the ligature from the specimen and stretched it between two pins. The distance between the two pins was twenty-one millimetres. I then obtained a fresh aorta and ligated it as tightly as I could, and on removing the loop, found that it measured nineteen millimetres between the two pins. This convinced me that the ligature did really occlude the aorta, for, on comparing the fresh specimen, I found that the aorta from my patient was somewhat wider than the other one. Additional evidence—the absence of pulsation in the femoral after the operation was concluded and its gradual return, the absence of pulsation in the aneurism, which was at first somewhat difficult to determine positively, and the diminution in size of the aneurismal sac—convinced me that the aorta was entirely occluded. It is also to be noted that when I tied the fresh specimen it was not perfectly conical at the site of the ligature, but was folded

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[1] American Journal of the Medical Sciences, September, 1900.

over upon itself. This would increase remarkably the size of the loop. The site of the ligature in reference to the branches of the aorta could not be determined with absolute accuracy from the specimen when I first saw it. It was certainly applied just below the diaphragm, as the pillars of the diaphragm were recognized at the time of operation. Whether above or below the cœliac axis was not quite certain, but it was surely applied above the renal and mesenteric arteries. In view of the position of the ligature, it is remarkable that the post-mortem showed no changes in the kidneys, and that the amount of urine passed, though much diminished in the first few days following the operation, was not much less than often follows any other operation. I regret very much that the necessary haste in which the post-mortem was made prevented the removal of the spinal cord and its microscopic examination. So far, however, as the clinical symptoms were concerned, there was no marked change in either sensation or motion.. The cutting off of the circulation produced coldness in both lower extremities, which, however, soon passed away, and later the man was able not only to move his legs, but to get out of bed and even to walk with his usual strength. One other marked symptom was observed immediately after the ligation of the aorta,— the very deep congestion of the upper portion of the body. This explained to me more forcibly than I had ever appreciated before the enormous force of the blood-current and the means by which the collateral circulation is established. In only three of the cases reported is the time given at which the femoral pulsation was observed to be re-established. In Stokes's case the femoral pulsation was observed in ten hours, in Monteiro's on the third day, and in my own it was observed in a little over five hours after the conclusion of the operation. Its immediate re-establishment, it seems to me, was probably due to the partial collateral circulation already in existence by reason of the aneurism. In Czerny's first case the collateral circulation, as he says, must have been established very soon, as there was no visible disturbance of the circulation in the other leg. In 1864, in a case of ligation of the common carotid, I observed the re-establishment of the temporal pulse on the side of ligation in five and one-half hours after the ligation."

THE TREATMENT OF ANEURISMS BY SUBCUTANEOUS GELATINE INJECTIONS.—Thomas B. Futcher [1] says that to Lancereaux, of Paris, is due the credit of having introduced this method to the medical profession. The solution is made by dissolving four or five grammes of white gelatine in two hundred cubic centimetres of 0.7 per cent. sodium

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[1] Journal of the American Medical Association, January 27, 1900.

chloride solution, and sterilizing thoroughly at 120° C. The flasks holding the solution are kept for several days at a temperature of 38° C., and any in which the gelatine becomes turbid or fails to harden in the cold are discarded. For giving the injections Lancereaux uses a sterilized flask having a capacity of five hundred cubic centimetres, with a tight-fitting rubber stopper, through which two glass tubes pass. One of the glass tubes extends to the bottom of the flask and is connected by rubber tubing with a proper-sized needle. To the other short glass tube a stiff rubber inflating bulb is attached. In order to purify the air a glass bulb filled with absorbent cotton is interposed between the rubber bulb and the flask. The temperature of the gelatine solution must be 37.6° C. According to Lancereaux, no pain should be produced by the injections. With proper asepsis there should be neither general nor local reaction. After the injection the patient should have absolute rest, and palpation of the aneurism must be avoided. The injections are made at intervals varying from two to fifteen days. Lancereaux thinks that the best results are obtained by giving them every sixth or eigthth day. He states that ten, fifteen, or twenty injections are generally necessary to effect a cure. He advises injecting the gelatine solution into the subcutaneous tissue of the thigh, and never into or in the vicinity of the aneurismal sac.

Huchard emphasized the importance of aneurism patients taking the proper sort of diet. An essential point in the treatment is the lessening of the arterial tension. For this reason all sorts of food which tend to produce toxins having a vasoconstrictor action should be avoided. Bouillon, fat soups, meat, fish, particularly sea-fish, and cheese must be excluded. Alcohol, tea, coffee, and tobacco are also forbidden. A strict milk diet is preferable, but fruits and leguminous foods may be permitted. Drugs which cause a dilatation of the blood-vessels, such as iodides and nitrites, are also useful.

Of Lancereaux's five cases three were reported as being cured. In these cases the aneurism was saccular in form. The other two, which terminated fatally, were instances of diffuse dilatation of the arch of the aorta. In all five cases no local reaction followed the injections, there was no elevation of the temperature, and the injections were not painful. In the two fatal cases no serious consequences occurred which could be attributed to the gelatine injections. That the gelatine injections are not entirely without danger to the patient is suggested by the cases reported by Boinet and Barth. They state that " the following conclusions may be drawn from our experience with the gelatine treatment in nine cases: (1) In not a single instance has the aneurism been cured, although in one case the abdominal

aneurism has diminished considerably in size and the case is still under treatment. (2) In seven of the nine cases there was no appreciable diminution in the subjective symptoms referable to the pressure of the aneurism. (3) It seems quite certain that the subcutaneous injection of gelatine solution does materially increase the coagulability of the blood. (4) Contrary to the statement of Lancereaux, the gelatine injections are frequently very painful to the patient, the pain lasting and being most intense often as late as six hours after the injection. (5) Although Lancereaux states that with strict antiseptic and aseptic precautions there should be no elevation of temperature, we have found the contrary to be the case. In several instances the injections were followed, from two to four hours later, by a distinct chill, with an elevation of temperature reaching at times as high as 103° F. In no case did we have any local suppuration, and in only one case was there even local reaction. (6) Notwithstanding the fact that we have not yet a case which can be reported as cured, I am convinced that there is some merit in the treatment, and that it deserves a further trial."

APPENDICITIS.

CONSERVATISM IN THE TREATMENT OF APPENDICITIS.—The medical profession, both in its societies and in the medical journals, has been much occupied with the discussion as to when to operate in cases of acute appendicitis, and whether in all cases operation is the best treatment. The members of the profession at large have been divided into three classes,—first, those who believe that operation should be done as soon as possible after diagnosis is made; second, those who hold that it is better to wait, especially in first or mild attacks, until there is some special reason for operation; and the third class, who think that at least a fair proportion of cases of appendicitis result in recovery without operation and do not suffer from recurrence. The second group has a great deal in its favor, both from the evidence of statistics and from the state of mind, usually present, which makes us assume that we ought to relieve our patients with as little surgery as possible, as a matter of general principle. The position of the first class involves acceptance of the following statements: that appendicitis is always a grave and important disease; that it is never cured spontaneously; that the attacks are very apt to increase in severity; that the course of an individual attack involves several important elements of uncertainty; that there is no real non-operative treatment of the disease, though the symptoms can be mitigated and temporarily removed; and that operative treatment in competent hands,

undertaken at the proper time, gives an exceedingly small death-rate, which is unquestionably becoming still smaller and is unapproached by any form of non-operative treatment. The interval between the beginning of the attack and the operation is of the greatest importance in the prognosis, and no hard-and-fast rule can be made. True conservatism in treating a patient with appendicitis consists in knowing when to operate upon a condition which sooner or later is certain to demand operative intervention, and in carrying out this intervention promptly and intelligently. During a thorough discussion of this question before the New York Medical Union by the different members of the society, Dr. Robert T. Morris said that we should be guided by a knowledge of the pathology of the disease rather than by any personal experience. He stated that he had operated upon many patients who were reported as cured by medical treatment.

Experience undoubtedly goes to show that many persons who report themselves in good health have had constipation or gas formation and do not feel vigorous or ambitious. This condition of inferior health may be due, first, to infection from a mucous inclusion, secondly, to adhesions of the bowel inhibiting peristalsis, or, thirdly, to reflex disturbance of the Auerbach's plexus and Meissner's plexus, fermentation taking the place of digestion. Dr. A. F. Currier asked, Why is it that peritonitis chooses this portion of the abdomen? Is it because the appendix lies there and is subject to changes? It is certainly a fact that in a great many cases in which there was no abscess and the appendix was buried in adhesions, the circulation was interfered with and was a constant menace to life.

From an article by Joseph Wiener, Jr., Adjunct Attending Surgeon, Mt. Sinai Hospital, New York, entitled "When shall we operate for Appendicitis?", and published in the *New York Medical Record,* we extract the following. " I am almost daily coming in contact with cases of appendicitis that are sent to hospital by physicians. Many of these patients have already perforation of the appendix, and not a few have general peritonitis. In one hospital alone I found in five years seventy-six cases of general peritonitis due to disease of the appendix, almost every one of which, of course, terminated fatally. Had these seventy-six cases been sent to the hospital early, a large majority of them would have recovered. The term ' early operation' is a relative one. Much harm has been done by attempting to lay down rules as to the day and hour that operation should be performed. Several cases were sent to the hospital on the third or fourth day of the disease, sometimes even on the second day, with general peritonitis. It is advisable to urge operation in children even earlier

than in adults, for a child's heart cannot withstand sepsis as well as
an adult. The first attack of appendicitis very often does not mean
the beginning of the disease: there may have been a catarrhal in-
flammation or even laceration of the mucous membrane of the appendix
for a long time before the onset of what is generally taken for the
first attack. An acute attack may mean that the ulcerative process
is suddenly increasing, or that a foreign body (coprolith) is super-
imposed on a previously long present ulcer, or it may mean that the
peritoneum about the appendix is becoming inflamed. If we fail
to keep these anatomical facts in mind, we will frequently be dis-
agreeably surprised on opening the abdomen—early in the attack,
as we suppose—to find perforation of the appendix and a general
peritonitis. If, on the other hand, we keep the pathology before us,
we will be more anxious to operate very soon after the beginning of
an acute attack, for we shall likely get a history of slight pain at
times in the right iliac region for months preceding the first acute
attack, and in these cases we are almost sure to find a diffuse peri-
tonitis. This is true to even a greater degree in recurrent attacks,
for here we know that a pathological process has been for weeks or
even longer going on inside the appendix, and we do not know how
near that process in the appendix is to perforating; a few hours may
bring on a fatal perforation; hence it will be wise in the second or
third attack to operate earlier than we would in the primary attack
with the same intensity of symptoms."

Richardson thus concludes a recent paper on this subject: " (1)
Not every case of appendicitis should be operated on. (2) After the
first mild attack, try regulation diet and salines. (3) After the first
severe attack, remove the appendix. (4) After two or more even mild
attacks, operate. (5) In an acute attack, 1st, do not give opium
or morphine; 2d, operate during an attack (a) if a chill manifests
itself; (b) if pain is severe enough to require morphine; (c) if the
pulse is very small or rapid or irregular; (d) if there is persistent
vomiting; (e) if there is persistent rigidity of the abdominal mus-
cles; (f) if an abscess can be felt; (g) if the general condition makes
it imperative; (h) if in doubt."

The fallacy of statistics in comparisons between the medical and
surgical treatment of appendicitis is well brought out in a paper
by Dr. Edwin Marion Cox, published in the *New York Medical Record,*
in which he quotes the result of seven thousand two hundred and
thirteen cases, among which four hundred and seventy-three were
operated upon, with a mortality of twenty-one per cent., and six
thousand seven hundred and forty were treated without operation,

with a mortality of eight and eight-tenths per cent. It is admitted that twenty and eight-tenths per cent. of these cases recurred, but the observer does not give the period during which these cases were watched, and of the cases represented by eight and eight-tenths per cent. mortality we do not know how many could have been saved by timely surgery. The high mortality after operation in these cases immediately strikes the American surgeon. There is now not the slightest doubt that in competent hands mortality after removal of the diseased appendix in suitable cases during the quiescent period is practically nothing, and that in acute cases of various kinds the figure is much lower than any medical form of treatment can possibly hope to show by any variety of medication known to the profession at the present time.

THE HOCKEY-STICK INCISION.—Willy Meyer says that in most cases of acute appendicitis he begins the incision half an inch above and midway from McBurney's point and the anterior superior spine of the ilium, and ends it from half to three-fourths of an inch from Poupart's ligament. He first ascertains where the femoral artery is pulsating under Poupart's ligament, and then cuts towards this point. His practice is to enter the peritoneal cavity at the lower end, and, with his finger inside as a guide to the position of the epigastric artery, enlarge the incision downward and inward in a curved direction. This gives to the whole incision the shape of a hockey-stick. The incision is exceedingly useful in intrapelvic operations. Even the left Fallopian tube and ovary can be palpated by two fingers passed through this incision.

ABDOMINAL SURGERY.

THE PHELPS OPERATION FOR HERNIA.—In 1894 Phelps reported a new method for the closure of abdominal wounds, especially those made for the relief of hernias, in which he used silver wire in a mattress-stitch instead of silk, kangaroo tendon, or any other absorbable sutures. He has recently reported [1] the results of two hundred and fifty-one cases of hernia in which he used his method, forty-six being relapses from the Bassini operation and fifty-one from other operations, chiefly that of McBurney. He bases his plan on the clinical fact that scar-tissue, unless the scar has something in it to prevent, will stretch. To obviate this stretching he inserts a continued suture of fine silver wire, in addition to which, in extremely thin abdominal walls, a mattress of loops of silver wire is introduced over the transversalis fascia, and underneath all the muscular coats. This wire

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[1] New York Medical Record, September 22, 1900.

becomes encysted in the granulation tissue, preventing subsequent stretching. So far as he knows, silver wire has always been introduced into tissues as an interrupted suture, to facilitate its removal if it should cause any disturbances. If this wire is sewn into the tissues as a continued suture, it not only becomes encysted, but remains so during the patient's lifetime, and causes no trouble whatever.

In hernia operations Dr. Phelps fortifies the inguinal canal with a mattress of wire, stretching the muscular layers over, entirely obliterating the canal, bringing the cord out underneath the skin, and cutting the aponeurosis of the muscles so as to prevent strangulation of the cord.

Relapses in oblique hernia take place at the internal abdominal ring, and, in other forms of hernia, at the external. One of the very serious mistakes made by all operators is the ligation of the sac. Frequently after a ligation of the sac retraction of the peritoneum and transversalis fascia takes place, leaving a large surface, from three-fourths of an inch to two inches in diameter, which is not covered by the fibrous tissue and natural support of the abdominal walls. To obviate this accident, Phelps cuts off the sac and retracts it from the operation precisely as any other abdominal operation, stitching up the peritoneum and transversalis fascia with a continued suture of silver wire, as is described above. Over the transversalis fascia and peritoneum a mattress of fine silver wire is to be next placed and the deep layer of muscles stitched over it with continued suture of silver wire. A small glass drainage-tube is inserted down to the wire mattress. If a large hernial opening is to be stopped and there is very much attenuation of the muscular coats of the abdominal walls, a second mattress of wire is placed between the layers of muscles, and a superficial layer of muscles, together with the aponeurosis, is to be stitched over it. The cord is brought out from the inguinal canal externally and inferior to the internal abdominal ring. A notch made by cutting with scissors in the aponeurosis of the muscles prevents strangulation, and the cord lies directly under the skin in its course to the scrotum.

The silver wire used by Phelps is taken out of pure carbolic acid and heated to a red heat in an alcohol lamp before its introduction into the wound, thus furnishing a material which is thoroughly sterilized and cannot produce irritation. In his two hundred and sixteen operations infection at the seat of the wire mattress has occurred sixteen times. In such cases he opens the wound and with a fine curette removes all of the infected portion, fills the wound with pure carbolic acid, then washes it out with alcohol, which is a perfect anti-

dote to the corrosive effects of carbolic acid, and allows the wound to heal by granulation. Not one of the cases so treated has relapsed, and that portion of the abdominal walls is the strongest part.

OPERATIVE TREATMENT OF CIRRHOSIS OF THE LIVER.—Charles H. Frazier [1] gives a short history of the operative treatment for cirrhosis of the liver, and reports a successful case of his own from which we quote liberally. Though the operation for the relief of ascites due to cirrhosis of the liver was suggested some years ago, it is only recently that it seems to have attracted the attention that it deserves, and to Rutherford Morison belongs the credit of having brought the first case to a successful issue.

Frazier's case was operated upon July 25, 1900. The parietal peritoneum of the abdominal wall, on either side of the incision, was rubbed quite vigorously with a gauze pad, and the omentum, which was very much thickened and contracted, sutured to the parietal peritoneum and to the margins of the wound. The fluid contents of the abdominal cavity were evacuated, and the incision closed without drainage. Convalescence was uninterrupted, the patient suffered no ill effects from the operation, and the wound healed *per primam* throughout. The patient was tapped twice,—once on the thirteenth day and again on the thirty-sixth day after the operation. From that time to the date of writing there had been absolutely no accumulation of fluid. The patient had gained rapidly in strength, he was no longer bedridden, had gone out daily, and had received no medication other than enough citrate of magnesium to insure a daily evacuation of the bowels

The technique is very simple. The operation should be performed under local anæsthesia, as individuals afflicted with cirrhosis of the liver are usually alcoholics, a class in whom ether narcosis very materially affects the mortality. An incision three or four inches long is made in the median line or in the border of the rectus above the umbilicus. The peritoneum of the adjacent surfaces of the diaphragm, liver, and spleen and the peritoneum on either side of the wound are scarified with a blunt curette or rubbed with a gauze pad. The latter is the better procedure, as it will give rise to less bleeding and yet will excite a peritonitis sufficient to insure adhesion between the apposed surfaces. The omentum is sutured to the parietal peritoneum for a distance of three or four inches on either side of the wound and to the margins of the wound itself. After evacuation of the fluid, the wound is closed without drainage. In a number of the recorded

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[1] American Journal of the Medical Sciences, December, 1900.

cases a drainage-tube was inserted through a suprapubic opening and removed about the fourth day. Frazier believes that such drainage can have no beneficial effect upon the ultimate results, while it certainly introduces an element of risk, as in Weir's case, which resulted fatally from peritonitis, due to infection by way of drainage-tube. It may be necessary if drainage is not introduced, as in the author's case, to tap the patient on one or more occasions during the time that the adhesions and venous channels are forming. The dressing is secured in place by broad strips of adhesive plaster, which are applied for the purpose of keeping in position the scarified surfaces of the liver, spleen, and diaphragm.

The chief indication for the operation is the presence of ascites from obstruction of the veins of the portal system, when the obstruction itself is due to cirrhosis of the liver. It is not indicated, however, in every case of hepatic cirrhosis with ascites. The operation is absolutely dependent for its success upon the retained function of the liver cells.

In conclusion, Dr. Frazier states that the cases are so hopeless, while the technique is so simple, the danger so trivial, and the outlook so promising that the operation seems likely to become an established mode of treatment. That surgeons now have at their command a rational and reliable method of affording relief, sometimes temporary, ofttimes permanent, to intractable cases of ascites seems to be a very fair conclusion to draw from the accumulated evidence.

We recently made a necropsy upon a case of capillary drainage for ascites from cirrhosis of the liver, also one upon a case of irritation of the peritoneum for the purpose of establishing a collateral circulation. The ascites in the latter case was found not to be due to cirrhosis, but to an infectious thrombus of the portal vein.

TREATMENT OF DIFFUSE SEPTIC PERITONITIS BY THE ELEVATED HEAD AND TRUNK POSTURE.—This new and valuable therapeutic expedient suggested itself to George R. Fowler during the after-treatment of a case of diffuse septic peritonitis, which resulted from early perforation of a violently inflamed appendix directly into the peritoneal cavity and between the coils of small intestine, and in which a glass drain as well as a number of wick drains had been placed deep in the pelvis. In treating cases of vomiting following etherization it had been the custom to raise the head of the bed as high as was consistent with comfort. In view of the favorable course which the case then in hand was pursuing, it was determined to adopt this as a routine procedure, for the purpose of facilitating the passage of septic fluids from the general peritoneal cavity to that of the pelvis,

where they would do but little harm and whence they could be more readily removed by drainage. Experience with the method seems to show that it is a valuable aid in combating this much-dreaded condition. Dr. Fowler reports nine cases thus treated, without a death; also, for the purpose of comparison, nine other cases of diffuse septic peritonitis, which received the same treatment with the exception of the elevated head and trunk posture. Of these nine patients four recovered and five died. These were not selected cases, but were in a group which in time and character more nearly resembled the nine treated successfully by the new method.

ULCER OF THE STOMACH.—The question of operation for ulcer of the stomach has been widely discussed during the past year, and the consensus of opinion seems to be that in ordinary cases no operation should be performed until all medicinal means have been exhausted. But in the case of perforation or hemorrhage operation should be immediately resorted to. The old method of washing out the cavity with water is no longer so extensively practised, and more surgeons now content themselves with wiping out as much of the effused material as can be reached, with more satisfactory results. Operation for hemorrhage has not been much more successful than the medicinal treatment, and until the bleeding becomes constant in spite of such method of procedure an operation is not considered to be justifiable.

AN OPERATION FOR VALVULAR OBSTIPATION.—Thomas Charles Milton described to the American Proctological Society a new radical operation for valvular obstipation. He said that a normal valve might be effaced under the pressure of the test-hook. A valve situated on the fixed posterior wall of the rectum is much more obstructive than one situated on the anterior wall, because the descent and backward flexion of the anterior wall place the fæces more securely in the pocket afforded by a posterior valve. A valve situated on the anterior wall, if on the same condition and dimension as one situated on the posterior wall, is less obstructive to defecation, for the reason that the backward and downward flexion of the rectal wall throw the fæces out of the valve affected and over its free border. If the number of the valves be greater than the normal three, of course the addition increases the obstruction. Anatomical coarctation or physiological juxtaposition of the valves might contribute to the establishment of obstipation, whether the valves are diseased or not. A valve situated at a direct right angle to the axis of the rectum is more obstructive than one situated obliquely. The resistance which any given valve presents to the test-hook, or the propinquity of other valves to a given valve, and the direction of the valve next above a given valve, together

with the number of valves in the rectum and the precise situation and direction of each valve—all are factors which should be studied as possible components contributing to the obstipation. Hypertrophy of the rectal valve due to a local or general proctitis is characterized by evident thickening of the free border of the valve. Fibrosis of the rectal valve is not characterized by an increase in size of the valve, though its resistance to the hook might be as great as in the case of the hypertrophied valve. The rectal mucosa above the obstructing valve is of pale complexion except in those cases in which there is evagination of the upper coat. Milton then outlined his operation for division of the valve, and detailed the precautionary measures to be employed to insure safety and secure success.

A. B. Cooke called attention to some mooted questions in proctology. These were—

1. *Anatomy.*—The existence of rectal valves was not yet generally admitted, when in truth they constitute the most conspicuous features of the normal rectum.

2. *Physiology.*—Among points in this connection yet to be worked out, the mechanism of defecation was a much-disputed subject.

3. *Pruritus Ani.*—Is this a disease or merely a symptom? The etymology of the term itself affords the readiest solution of the problem. Pruritus merely means itching, and itching could not be regarded as other than a symptom. It is sometimes difficult to locate the lesion that gives rise to it, though it is practically always a macroscopic one. In searching for it the reflexes are to be borne in mind.

4. *Simple Ulceration.*—One prominent author, Matthews, stated that this disease, located above the sphincter ani muscle, was a very uncommon one. Dr. Cooke's experience had been directly opposite. The difference of opinion is probably due to different conceptions of the meaning of the word. Properly considered "ulceration" and "ulcer" are synonymous terms, and the rectal ampulla is a frequent site of such diseased processes.

5. *Benign Stricture.*—Attention was called to the different views held as to the frequency of syphilis as a causative factor. Sixty per cent. is far too high an estimate. The rectal valves have much to do in the etiology of this disease.

6. *Cancer.*—Discussion of this disease was limited to the question of the justifiability of colostomy as a means of prolonging life and affording comfort.

In speaking of the local treatment of pruritus ani, L. J. Adler, Jr., of Philadelphia, laid great stress on the daily evacuation of the bowels.

He injects into the rectum one, two, or two and one-half drachms of the following prescription:

> ℞ Fl. extract of hamamelis, fl ℥ i;
> Fl. extract ergot,
> Fl. extract of hydrastis,
> Tr. benzoin comp., of each fl ʒ ii;
> Carbolized (five per cent.) olive or linseed oil, ℥ i. Mix.
>   Sig.—Shake well before using.

This injection is to be retained for some time. The entire surface around the anus for several inches forward is painted with a strong solution of nitrate of silver; if any break in the continuity of the skin occur as a result of previous scratching, a two per cent. solution of cocaine is employed in addition to the silver salt. As soon as the silver solution has dried, the officinal citrine ointment or unguentum hydrargyrum nitratis is smeared over the anus and the cutaneous surface of the parts for a distance of about two inches around the orifice. Over the salve is placed a wad of absorbent cotton, the quantity of which varies with the wishes of the individual. This is held in place by a T-bandage. If during the night itching should be annoying, the anus is bathed with water as hot as can be borne with comfort, but under no circumstance should the parts be rubbed. After he has used the water the patient should apply either a solution of black wash or, what is still better in some places, calomel ointment.

INTESTINAL OBSTRUCTION DUE TO PERITONEAL BANDS.—A number of these cases have recently been reported in medical journals and before medical societies, and have elicited no small amount of interest among the profession; they further show the good results which may be obtained by operation. The chief causes of acute intestinal obstruction—namely, internal strangulation (including strangulation by bands or by Meckel's diverticulum and internal herniæ), volvulus, acute intussusception, and obstructions by gall-stones or foreign bodies—clearly show that there are few cases in which any good result can be hoped for except by operation. Yet the operative results hitherto have not been so good as could be wished, for the reason that cases have not come under the observation of the surgeon until some days have elapsed from the onset of obstruction. When the operation was performed within twenty-four hours of the onset, seventy-five per cent. of the cases recovered; operation after the third day was followed by only thirty to forty-five per cent. of recoveries. These figures show how rapidly these cases go to the bad and illustrate the evil effects of delay. Cases of obstruction due to bands are no exception to this rule; in fact, the results of operation in these cases

hitherto have not been so good as in cases of obstruction from gall-stones and foreign bodies and in cases of intussusception. And yet, if the operation be not greatly delayed, a peritoneal band will probably be more easily dealt with than any other cause of acute obstruction. In a case seen by us a thread-like band from an old extra-uterine pregnancy had caused death by volvulus.

GASTRECTOMY.—Delatour, of Brooklyn, adds one more case to the already growing list of gastrectomies, which since 1895, when Schlatter, of Zurich, proved that it was possible for a person to live after complete removal of the stomach, has been performed a number of times. Dr. Delatour's case was operated upon in May, 1898, on account of adenocarcinoma of the stomach, and he was able to observe the case for a period of about seventeen months, during which time there was no return of the disease, and in the six months following the operation the patient had gained thirty pounds in weight. Of all the many remedies which have been advised for the vomiting of pregnancy, no one has yet gone the length of recommending gastrectomy; but this case proves that even that radical method would be of no avail, for this patient became pregnant, and, though she did not vomit, she experienced the same nausea as in former pregnancies.

GENERAL SURGICAL SUBJECTS.

METHOD FOR THE REDUCTION OF DISLOCATIONS OF THE SHOULDER AND HIPS.—Stimson,[1] of New York, describes an easy method of reducing dislocations of the shoulder and hip, which he had employed for three months in the Hudson Street Hospital, with very gratifying results. The principle is that of steady moderate traction upon the arm in abduction, and the procedure is described by him as follows: A round hole six inches in diameter is made in the middle of the canvas of a cot about eighteen inches from one end. The patient is placed upon the cot with the injured arm hanging down through the hole, as shown in Fig. 1. The cot is raised upon blocks so that it will be at a sufficient height from the floor, and a ten-pound sand-bag is made fast to the wrist of the dependent arm. In a few minutes reduction is found to have taken place. None of the patients has complained that the procedure is painful. It is recommended as a safe, effectual, easy, and expeditious method. Theoretically it would be better to attach the weight to the arm close above the elbow, but in practice the wrist has proved to be the better place, for some of the patients would grasp the leg of the cot with the free hand, and thus interfere

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[1] Medical Record, March 3, 1900.

FIG. 1.—Method of reducing dislocation of the shoulder by means of a weight.

FIG. 2.—Method of reducing dislocation of the hip by a weight. (Neither of these patients had a dislocation; the method alone is shown in the pictures.)

with the action of the weight. The same method may be employed in dislocation of the elbow whenever the joint can be freely extended without the aid of anæsthesia, but under such circumstances traction by the hands alone is usually sufficient.

In dorsal dislocations of the hip the plan is thus applied (Fig. 2): The patient is placed prone upon a table in such a way that his thighs extend beyond its end. The uninjured thigh is held horizontal by an assistant, to prevent tilting of the pelvis, and the injured one is allowed to hang vertically, while the surgeon, grasping the ankle, holds the leg horizontal (right-angle flexion at the knee) and gently moves it from side to side. If relaxation of the muscles is slow to appear, a sand-bag weighing five or ten pounds is placed on the leg close behind the knee, or pressure is made there by the hand. This has succeeded in more than four-fifths of the cases in which it has been employed, and often without the aid of anæsthesia. In the two cases in which it failed, reduction was accomplished by traction in a line midway between right-angle flexion and full extension. These seemed to be cases in which the bone had left the socket at a higher point than usual, probably dislocations " above the tendon," so called.

INJURIES OF THE NERVES DUE TO FRACTURE.—Cumston [1] states that these injuries may occur simultaneously with the lesion of the bone or arise during the process of repair, the former of which is the more frequent. The severity of the lesion naturally varies with the amount of force in play at the time of the traumatism. If injury of the nerve is slight, a limited amount of paralysis results, which will disappear in a few days, while it may last for months or continue until operative measures are resorted to when the traumatic lesions are of severe grade. A considerable number of cases belong to the class in which the nerve is injured as a result of pressure from callus or an abundant proliferation of connective tissue at the site of the fracture. Trophic changes have also been observed in some instances. Other nerve lesions are total or incomplete laceration by direct force or by a dislocated fragment of the fracture; the radial nerve appears to be the one most frequently injured in this manner. Cases have occurred where a nerve-trunk has been caught between the ends of a fracture, the symptoms being pain and immediate paralysis of the parts supplied by the nerve. Occasionally the brachial plexus and the axillary and median nerves comprise the site of the injury. The nerves of the lower limb are infrequently injured, the most usual site being the peroneal nerve in cases of fracture of the head of the fibula, for the

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[1] Pediatrics, April 1, 1900.

simple reason that this nerve is closely related to the bone. Complete laceration of the nerve-trunk may sometimes occur. Bruns asserts that the most frequent cause of secondary nerve lesions in fractures is compression of the trunk by fibrous adhesions and exuberant callus formations. From the cases here reported it will be seen how much may be expected from an early operation and also how complicated may be the condition present, but the results are so encouraging that surgical measures should always be advised for the cure of this unfortunate complication of fractures.

GANGRENE FROM THE APPLICATION OF DILUTE SOLUTIONS OF CARBOLIC ACID.—Carbolic acid has become a general household remedy for the treatment of slight wounds and bruises, being used as a moist dressing. F. B. Harrington [1] has seen during the last five years at the Massachusetts General Hospital, either in his own practice or in that of other surgeons, no less than eighteen cases of gangrene arising from its use. From medical literature he has collected a large number of other cases which with his own make one hundred and thirty-two.

SURGICAL HINTS.—Never use morphine before anæsthesia in patients who are in a state of stupor or traumatic shock. In these the drug has a distinct tendency to increase these conditions.—Never have any more assistants at an operation than are absolutely necessary. They are apt to get into each other's way and increase the difficulty of securing asepsis.—Except in emergency cases every patient about to be operated on is entitled to as careful an examination as if he were applying for life insurance, and to treatment before the operation for any complicating condition.—Where it is important that the patient shall make no violent movements while being anæsthetized, as for instance in certain fractures, a full dose of morphine an hour before the anæsthesia will contribute a great deal to secure a quiet etherization.—When using cocaine hypodermically, it is seldom necessary to use a solution stronger than one per cent., and then always have the patient in a recumbent position. The danger of cocaine lies in the possibility of syncope from failure of the heart's action, and lying down is the best preventive.—When operating, never put too many instruments in one tray, as it becomes more difficult to find just what you want. It is best to have several small trays, and to put the cutting instruments in one, the artery forceps in another, and the special instruments required in the particular operation in a third. —During the removal of tumors having many attachments, free first

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[1] American Journal of the Medical Sciences, July, 1900.

all the points that are easily detached, and pediculate the tumor, as it were, where it is most difficult to free it. This will usually result in the largest vessels being included in the pedicle, so that with your ligature or clamp you may safely secure the most dangerous region and cut above it without danger.—In old ovarian lesions the patients often show a decided insufficiency in the secretion of urea. It is well to subject such a patient to preliminary treatment for this condition, which, if successful, will give her a better chance of recovering from the operation, and, if the patient's urine shows no improvement, the prognosis is rendered more serious, and forewarned is forearmed.[1]

CATAPHORIC STERILIZATION IN MALIGNANT TUMORS.—G. Betton Massey gives a summary of thirty-seven cases of carcinoma and sarcoma treated by him by this method of cataphoric sterilization, of which ten were cured, in seven the result was uncertain, and in twenty-two the method failed to cure.

The process consists in a cataphoric diffusion of nascent mercuric salts produced by the electrolysis of metallic mercury inserted by a gold anode into the growth, the patient being usually under general anæsthesia, and the chemical and cataphoric force being a direct current of from two hundred to twelve hundred milliamperes continuously employed for a time varying from fifteen minutes to two hours and a half. The immediate effects are the production of an area of necrosis involving the most evident portions of the growth, beyond which extends a zone of sterilization, in which the malignant germs are killed without destruction of the normal tissue elements. The zone of sterilization radiates in all directions, but especially through cellular planes of cancerous proliferations.

This report includes a number of cases that afterwards showed that metastases had been present before the treatment.

Of the thirty-seven cases, twenty-four have been recorded as failures or probable failures. Deducting the two cases in which death occurred during the application, we have twenty-two cases of failure to arrest the disease, without any bad consequences following the treatment itself. In nine of these cases the cause of failure was the development of latent metastases after the method had secured a local eradication of the primary growths, the metastases developing in each case without evidence of recurrence at the primary seat, showing that they were due to the lodgement of emboli from the primary growth previous to its destruction by cataphoresis. In the remaining thirteen cases there was failure to arrest the disease locally in the stage in which it was

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[1] International Journal of Surgery, November, 1900.

found, many of them being already recurrences after knife operations; and these failures to arrest were due to insufficient diffusion of mercury for various reasons: either failure to use anæsthesia and a strong current, or failures of batteries to give enough current in the early applications, or the fact that the growth was so close to the brain as to make an effective current impossible.

EVIDENCE OF PROSTATIC ATROPHY AFTER CASTRATION.—Edward L. Keyes, of New York, reviews this subject in a recent article in the *New York Medical Record,* in which he states that nowhere in surgery are pathology and practice apparently drawing wider apart than in the matter of castration for hypertrophy of the prostate. This operation was first presented to the world in 1893. The history of castration as a method of sexual depletion may be divided into three overlapping periods. During the first period, which reached its highest expression in White's essay of 1895, enthusiasm ran riot, and asexualization was hailed as the prostatic utopia. The second period, beginning with Albarran's report to the French Congress of Surgery in the same year, and reaching its climax in Cabot's report of the year following, and the erudite researches of Albarran and Motz, in 1898, was one of adhesion to the primary principles, with the beginning of wholesome doubt and careful investigation, but indefinite conclusions. The third period, one of firm convictions based in pathological findings, was first voiced by Floderins in 1897, and will culminate, we trust, in the coming International Congress of Paris.

To sum up: (1) Experiments, whether on man or the lower animals, relating to the normal prostate do not of necessity apply to the enlarged prostate. (2) There is no direct pathological evidence that castration has ever caused atrophy of an hypertrophied prostate. (3) There *is* such evidence that in a few cases it has failed to cause atrophy of the hypertrophied prostate. (4) The majority of cases reported thus far have been labelled " cured" or " improved" so soon after operation that many of them were doubtless instances of local depletion. (5) Clinical evidence of this is afforded by relapses occurring months after the operation. (6) Of the permanent cures some may be attributed to the advantage of reduced congestion. (7) The clinical evidence of the actual atrophy of the prostate after castration lacks as yet scientific confirmation, and has thus far failed to prove its title to the surgeon's credence.

BOTTINI'S OPERATION FOR THE CURE OF PROSTATIC HYPERTROPHY.—Though Bottini's operation was devised about twenty years ago, it is comparatively but a short time since it received the trial to which original ideas and methods should be subjected before being

placed in the list of approved treatments. One of the firm advocates of this operation is Willy Meyer, of New York, who, in an article in the *New York Medical Record,* states that, " if properly carried out in a suitable case, Bottini's operation *can* cure the patient afflicted with prostatic hypertrophy. It, therefore, belongs to the class of radical procedures that have been devised for the treatment of this trouble." He does not recommend its indiscriminate employment, but only in selected cases, as is now done with prostatectomy. He says that the results so far obtained with Bottini's operation have demonstrated (1) that the urinary troubles of prostatics are not dependent upon a weakness of the muscles of the bladder, due to arteriosclerosis (Guyon and Lannois's theory), but are the direct result of a true mechanical obstruction to the normal outflow of the urine at the neck of the bladder,—viz., the enlarged prostate gland; (2) that we are able to overcome this mechanical obstruction by the multiple division of the swollen gland with the galvanocaustic knife; (3) that we can generally accomplish ·this without any additional operation on the cords, testicles, or bladder; (4) that we have every reason to expect that, if the desired result of the operation be once thoroughly obtained, the cure will in most cases be a permanent one.

THE OBTAINING OF URINE DIRECT FROM THE URETERS FOR DIAGNOSTIC PURPOSES.—Brown described to the American Association of Genito-Urinary Surgeons, which met at Washington, May 1, 2, and 3, 1900, his double-barrel urethral cystoscope, and summed up its advantages as follows: (1) In favorable cases both ureters can be catheterized at approximately the same time. (2) In less favorable cases, after passing one catheter, the second catheter may be used to draw the distending fluid from the bladder, thus giving the organ repose. (3) In still more difficult cases the second barrel can be used for frequent irrigations, until fluid of proper transparency distends the bladder. (4) In some cases in which but one ureter can be catheterized, this double-barrel instrument promotes access to one ureter through one barrel, and urine coming into the bladder from the opposite kidney can be collected by catheter siphonage by the second barrel.

Otis did not believe that there was any satisfactory way to differentiate urines, and or ever would be, the difficulty of locating and entering the ureters being so great. He referred to the dangers of such a procedure when the attempt was made through an infected bladder. So far as the female was concerned, he thought that Kelly had solved the problem as thoroughly as it could be solved; but in the male the conditions were different, and he doubted whether any instrument with lenses would ever become popular. He had always been in favor

of the so-called "direct catheterizing cystoscope," of what Dr. Brown calls the "convex type."

Malcolm L. Harris, of Chicago, stated that catheterization of the ureters had a field of application that was absolutely distinct in the sense that no other means at our disposal accomplished the same end,—namely, to determine the nature and location of obstruction of the ureter, to locate the ends of a divided ureter, or act as a guide in certain intrapelvic operations, for tapping and draining the renal pelvis, for therapeutic measures, such as the dislodgement of calculi, irrigation of the renal pelvis, etc. Catheterization of the ureters, simply for the purpose of collecting urine for diagnostic purposes, had its drawbacks and limitations, among which might be mentioned temporary anuria, due to the presence of the catheter in the ureter, contamination of the urine with blood and epithelial cells from the ureter, and danger of infecting a healthy ureter and kidney. This point he thought to be of such a serious nature that a healthy ureter should not be catheterized when the bladder was infected or the opposite kidney tuberculous. The segregator likewise has its limitations in certain indirect vesical lesions. Its use must be supplemental to that of the cystoscope; but for the differential diagnosis of tumors of the abdomen, for determining which kidney is diseased, the functional activity of each, and whether the bladder is infected, and for differentiating between certain bladder and kidney affections, the segregator has given perfectly reliable results, as repeatedly demonstrated by anatomical findings. Furthermore, in infected cases it has the advantage of being free from the danger of infecting a healthy kidney.

THE TREATMENT OF SCROTAL HYDROCELES.—McAdam Eccles [1] describes the operation as follows. Two days previously the pubic hair should be removed and the skin rendered sterile. The whole of the scrotum is then to be covered with an antiseptic dressing of the double cyanide of mercury and zinc gauze ,so adjusted that it cannot become shifted. This cleansing is to be repeated next day and again on the table just before the incision is made. The sac wall is separated rapidly with the forefinger, aided by the scalpel here and there. The wound should be absolutely dry before it is closed, otherwise there may be formed a collection of blood which might seriously interfere with healing. When the sac has been separated from the scrotal tissues almost back to the epididymis behind and below and the cord behind and above, the scalpel is made to enter the sac, care being taken to avoid wounding the testicle, and the fluid is allowed to run

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[1] Treatment, January 25, 1900.

Gauge

From mains reservoir,

Pinchcock 1
Pinchcock 2

Pinchcock 3
Pinchcock 2
Pinchcock 4

Catheter

To Sewer.

FIG. 1.—Dr. Fluhrer's apparatus for washing out the bladder.

FIG. 2.—Rubber forcing N-bulb. Glass connections.

out. When all the sac has been evacuated, its wall is cut away with scissors to within a quarter of an inch of its reflection on the anterior surface of the testis internally, and on the outer side close to its reflection on to the epididymis. Bleeding vessels are promptly secured by pressure-forceps. If the upper part of the sac extends much above the level of the testicle, it will have to be followed up and excised, with care to avoid wounding the cord which lies behind it. The parietal layer of the tunica vaginalis will now have been removed. The visceral layer of the serous membrane is next rubbed with a 1 to 20 solution of carbolic acid, to destroy its endothelial covering.

AN APPARATUS FOR WASHING OUT THE BLADDER.—Fluhrer's apparatus [1] for washing the bladder without producing spasm, the organ remaining at rest while the liquid that it contains is more or less agitated, consists of a main and a secondary reservoir with a distributing or washing apparatus. To the secondary or measuring reservoir is attached a glass gauge, for determining the bladder-level or pressure. The washing apparatus proper consists of two glass bulbs, with tubular glass extensions, connected with properly attached rubber tubing. The flow of liquid is controlled in its distribution by pinch-cocks. The larger glass bulb creates a partial dead water when the apparatus is in action, allowing any sediment to fall into the trap constructed on its lower side. This trap connects, by means of a branched pipe, with a tube leading to the sewer, and also with the measuring reservoir. An ordinary rubber bulb attached to the glass bulbs acts as an injector and aspirator; by forcible compression of this the liquid in the bladder is agitated. A rubber coupling facilitates the attachment of a soft rubber catheter. (Figs. 1 and 2.)

The apparatus is brought into action by expelling the air and filling with the irrigant by opening appropriate pinch-cocks. The ingress and exit of the bladder liquid are controlled by a pinch-cock upon the catheter. The surgeon can, by compression of the rubber bulb, throw the charge in the apparatus into the bladder, and by releasing the compression, withdraw it, thus stirring up any residuum, slightly cleansing the bladder, and fouling the apparatus. This fouled charge is disposed of, and the apparatus refilled, from the reservoir of supply, by opening certain pinch-cocks, allowing the one to flow into the sewer and the other to take its place. The apparatus is so arranged that a definite, measured quantity of the irrigant may be allowed to flow into the secondary reservoir, from the main or supply reservoir, and from here by means of the rubber bulb into the bladder.

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[1] New York Medical Record, June 23, 1900.

The apparatus may be readily cleansed, by attaching the catheter to a hydrant, and allowing hot water to course through it and the tubes by opening the various pinch-cocks.

THE X-RAY DIAGNOSIS OF NEPHROLITHIASIS.—Leonard[1] has devised a method by which he claims he can make the absolute negative as well as the positive diagnosis in all cases of suspected renal calculus. This he does by using rays that will differentiate between the shadows of tissues less dense than the least dense calculus.

A NEW PHOTOGRAPHOMETER.—John Milton Garratt[2] has introduced a device to picture bodily deformities graphically, which conduces to perfect records with an expenditure of a minimum amount of time and energy. The name of photographometer is given thereto, a term which suggests its use. It consists of threads, black and white, placed equidistant so as to form perfect squares of one inch. The black threads are intended to designate feet; the white, inches. The threads are strung from hooks driven into the vertex of the angle formed by the glass-retaining projection and the inside of a solidly made picture frame. To preserve perfect squares it is of course necessary that the threads be strung all from the same side of the hooks. A frame secured, it is best to measure off the exact centre on each of the four sides. Then pin in place a cloth tape measure, and from the centre mark the inches with a short stroke of a pencil, the feet with a long stroke. Next the hooks are placed, then the threads strung. Coates' No. 8 in black, and No. 13 in white, will give good results. The black is placed first, beginning from the centre; string this to the opposite centre hook. Next form the white squares. All squares may be formed without destroying the continuity of the thread. The size of the frame will depend upon the particular purpose for which it is intended. For general use one four by five feet will meet requirements. In the practical application of the device care should be taken to have the frame and camera upon the same plane, otherwise the squares are likely to be distorted. It is convenient to suspend the frame by means of rods with hooked ends to a wire,—rod adjustment being allowed for by the use of thumb-screws fastened into the lateral sides of the frame. The wire must be quite taut to prevent vibration. It is of course understood that the apparatus is to be placed in a good light. The accompanying illustration (Fig. 3) elucidates the application of the device.

A NEW URETHROSCOPE.—Leviseur describes this instrument as a

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[1] Philadelphia Medical Journal, January 6, 1900.
[2] Ibid., December 22, 1900.

FIG. 3.—Dr. Garratt's photographometer.

tube closed at its distal end and fenestrated on the side, the slit extending to within one-quarter of an inch of each end. The obturator has the shape of the ordinary straight sound, and a V-shaped mark on the disk indicates the position of the fenestration.

The instrument is applied to the part in the same manner as the ordinary urethroscope. When the obturator is withdrawn, a considerable portion of the mucous membrane is brought into view, and the urethra can be readily inspected in its whole circumference by introducing the obturator and rotating the tube through an angle of ninety degrees.

A RECTO-GENITAL IRRIGATING TUBE.—Guiteras, in describing this tube, says that, although used in the rectum, it is intended to treat genito-urinary diseases affecting especially the prostate gland and the seminal vesicles. The tube is six inches long by one-half inch in diameter, is slightly curved at the end, and is made of hard rubber or metal. There is an opening at the concavity for the entrance of the fluid and two openings on either side of the straight part of the shank which allow exit for the solution in a larger stream than it enters, thus preventing any accumulation of liquid in the bowel. The fluid used is hot salt solution or flaxseed tea at a temperature of one hundred and five degrees to two hundred degrees Fahrenheit.

The technique of a rectal irrigation consists in the patient assuming a reclining position, with the limbs elevated; the douche bag is hung on a level with his head; the tube is lubricated and introduced, by a rotary motion, for two and three-quarter inches ·for the prostate, and three and one-half inches to four inches for the seminal vesicles. The irrigation is best administered at bedtime, and from one to four quarts of the solution should be used.

OBSTETRICS AND GYNÆCOLOGY.

CLEIDOTOMY (DIVISION OF THE CLAVICLES).—J. W. Ballantyne [1] recommends this operation in cases of contracted pelvis or of broad-shouldered fœtuses with impaction, in threatened uterine rupture, in eclampsia, or in any condition necessitating rapid delivery. As yet cleidotomy has been performed only on the dead fœtus. It is accomplished by passing the index and middle fingers of the hand which corresponds to the anterior aspect of the child up to the clavicle,

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[1] Scottish Medical and Surgical Journal, January, 1901.

and along this groove, as a guide, pushing a pair of long, strong, and straight scissors, with which the bone is divided. There need be no fear of injury to the maternal parts, as the cut ends immediately override each other, with a reduction in the bisacromial diameter of from one to three centimetres in the unilateral operation, and from three to four centimetres in the bilateral. This procedure is simpler, more rapid, and much more elegant than the indiscriminate and unregulated embryulcia of the shoulders and thorax.

GYNÆCOLOGICAL ASEPSIS.—H. Macnaughton Jones,[1] of the Royal University of Ireland, calls attention to the following faults in the securing of gynæcological asepsis. (1) Defective sterilization of the rectum and vagina for at least forty-eight hours prior to operating. In the case of the rectum this is avoided by the use of saline aperients, a dose of calomel, and lavage with sterilized aqueous solution of permanganate of potassium 1 to 1000 or a sterilized solution of boric acid; and in that of the vagina by thorough washing out with a 1 to 1000 formalin solution, lysol, traumatol, or perchloride of mercury, followed by a tampon of sterilized iodoform or chinosol gauze. (2) The want of thorough cleansing of the entire body of the patient by the use of a warm bath in which the skin is well scrubbed with lysol soap. (3) Defective shaving of the entire hair of the external genitals after the final bath, followed by proper packing of the abdomen with an antiseptic pad, such as 1 to 1000 of formalin. (4) Want of attention to the clothing of the patient when she is placed on the operating-table, as to its warmth and cleanliness, and omitting to see that the feet and legs are well enveloped in sterilized flannel bandages. (5) Inefficient sterilization of the abdomen (especially of the umbilicus) or of the vagina,—of the abdomen and umbilicus by a special washing, when on the table, with lysol soap and a brush, perchloride of mercury with alcohol, and finally ether. (6) Nothing non-sterilized should touch the hands or arms of any one engaged in an operation after the completion of their sterilization. Though one who is experienced in the preparation of the hands may complete the sterilization in a period of five minutes, much longer is required by the inexperienced assistant or nurse. No one engaged directly in any gynæcological examination should have a projecting finger-nail. (7) Failure may be consequent upon imperfectly sterilized sponges, gauze compresses, or dabs; or, even if these have been made sterile, by their being brought in contact with any source of infection, either through the hand of a nurse or assistant or by careless reuse when they have been infected.

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[1] Edinburgh Medical Journal, May, 1900.

(8) With care, failure is not likely to occur from the use of infected instruments if they be sterilized by means of a dry stove, and are of such a kind that their blades and handles can be easily detached so that the joints may be thoroughly subjected to the necessary heat. Danger more frequently arises from the use of instruments which have become infected during the operation, and which are not re-sterilized at the time. (9) While the position of Trendelenburg is invaluable in the majority of pelvic operations, it has its dangers with regard to asepsis from the tendency of infective fluids to gravitate from the pelvic cavity to the bowel and thus infect the latter. (10) When an operation is completed, hæmostasis assured, and drainage, if necessary, provided, there are still remaining some most dangerous loop-holes for sources of infection. These are to be found in the abdominal or vaginal toilet.

CANCER OF THE UTERUS.—Henry C. Coe [1] emphasizes the importance of early diagnosis, and urges that the laity as well as the practitioner should be taught to recognize the early signs of uterine cancer, so that they may come for operation before it is too late. In this country it is estimated that not much more than two per cent. and in Germany less than thirty per cent. of the cases are operable when they come to the clinics. In private practice the number of hopeful cases is much larger. The German statistics are so much better than the American and English reports that an Edinburgh surgeon suggested the possibility of a difference in the disease. This disparity of results, however, is due to the fact that the diagnosis is made earlier, as the patients come sooner for operation, and that the operative technique is better.

The classical symptoms of pain, tumor, and foul discharge are not necessary in order to make the diagnosis of uterine cancer. When these symptoms are present, the case is probably beyond the reach of operative procedures. An important and often very early symptom is irregular bleeding from the uterus. The patient and practitioner must be made to understand that the approach of the menopause does not justify the existence of irregular bleeding. Such hemorrhage is always suspicious, especially if the patient is between forty and fifty years old. If there are no signs of cancer to be found on bimanual palpation, a wedge-shaped piece should be cut from the cervix or the interior of the uterus curetted, and the specimens obtained submitted to microscopic examination for a positive decision of the question as to whether cancer exists. The occurrence of irregular

[1] Medical News, April 7, 1900.

bleeding is of itself sufficient to justify operation. Two conditions, both of which are benefited by operation, may lead to an error of diagnosis; a small fibroid or senile endometritis may be the cause of the irregular hemorrhage.

The important contraindication to operation is the invasion of other tissues by the cancerous process. In order to decide whether this invasion has taken place or not, the patient should be examined under an anæsthetic. Enlarged glands cannot be palpated with any assurance, and they are frequently found after operation in positions where it might have been thought that they could not escape the examining finger. It is important to differentiate between true neoplasmic adhesions and inflammatory adhesions.

Surgical opinion is much divided on the question whether the vaginal or the abdominal route should be taken in operating. The vaginal route is growing in favor. Cancer of the corpus uteri will nearly always have to be removed by laparotomy. In very stout or in very weak patients it may be necessary to try the vaginal route even for these cases. For cancer of the cervix a serious question exists as to whether the cervix only should be amputated or the whole uterus extirpated. As a rule, better ultimate results are obtained by total extirpation of the uterus. Of late years an attempt has been made to do for cancer of the uterus what has been accomplished by Halsted's operation for cancer of the breast. The idea was to remove all the pelvic tissue that seemed liable to be infected because of the lymph drainage from the uterus. This radical procedure adds very seriously to the mortality, and should be undertaken only in strong, healthy females. In such patients the hope of radical cure given by this operation, notwithstanding its primary mortality of at least twenty per cent., seems to justify the added risk. Doubtless, too, the danger of the operation and the length of time necessary to perform it will be gradually lessened by improvement in technique and by the acquirement of the special skill necessary for this class of work.

Despite the spread of knowledge with regard to cancer, a large number of cases still come to the surgeon only when operative measures are absolutely hopeless. For these the palliative treatment, consisting of the use of the cautery or the sharp spoon, is clearly indicated. The symptoms are very much relieved thereby, and the progress of the disease is hindered for a time. The foul discharge, which so often makes life miserable for the patient and so unpleasant for her friends, is completely done away with.

MENORRHAGIA IN GIRLS.—Armand Siredey [1] is of the opinion that

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[1] Pediatrics, May 15, 1900.

the treatment depends upon the pathological condition which causes the hemorrhage, and rarely is it necessary to treat the bleeding directly. In cases of extreme necessity, however, we may use very hot douches, simple or with gelatin solution, or small quantities of fluid (two hundred cubic centimetres) frequently repeated. Rectal irrigations with very hot water by means of the double current tube may be used for a considerable length of time. The application of ice to the abdomen and the administration of ergotin by mouth, by rectum, or hypo-dermatically are measures which will seldom fail to arrest the bleed-ing. Above all, complete rest in bed is an essential part of the treat-ment.

HYSTERECTOMY IN PUERPERAL SEPSIS.—Prochownick[1] draws at-tention to the fact that the mortality of the puerperal state has not been lessened as greatly as was hoped since the adoption of antiseptic precautions in labor. He has found the serum treatment to be use-less, and has given attention to the problem of finding out when the septic puerperal uterus should be extirpated. It is evident that this serious procedure is justifiable only when it is positively known that the uterus is the site of the infection, when other methods have failed, and when the patient is evidently growing worse. He directs attention to the importance of studying each case during the first two days of the puerperal period without disturbing the patient by prolonged ex-aminations. Each patient who has fever should be kept as quiet, as clean, and as comfortable as possible. The pulse, temperature, and respiration should be carefully recorded every four or six hours. The intestine should be emptied once in the most thorough manner possible, and the patient examined once very carefully and thoroughly. If the pulse reaches 100, the heart, the lungs, the spleen, the lower birth-canal, and the urine, taken by catheter, should be thoroughly examined. Lacerations and fissures in the perineum and vagina must be looked to, and if no focus of infection is found and the pulse does not exceed 100, no further examination of the birth-canal need be made. When, however, the patient's condition is serious, with chills, high fever, a small and rapid pulse, the vagina should be douched with warm sterile water, and some of the lochial discharge should be taken from the cervix. A careful bimanual examination may also be made. The writer sums up his experience by stating that he cannot decide upon extirpation of the uterus from the results of examination of material taken from the vagina or uterus, but that he considers the examination of the blood of far more importance. If pyæmia is present, complicated

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[1] American Journal of the Medical Sciences, February, 1900.

with tumors in the pelvis, suppurating portions of the ovum, or septic criminal abortion, extirpation of the uterus is not indicated, because it can rarely save the patient. If, however, it is evident that the uterus alone is pyæmic and that these complications are not present, then the removal of the uterus may be followed by a good result.

PREGNANCY AFTER VENTROFIXATION.—Braithwaite[1] reports two cases of ventrofixation which were followed by pregnancy and by delivery at full term. One patient suffered from pain in the line of the incision, evidently caused by dragging of the enlarging uterus upon this fixed point, and towards the end of labor there was inertia of the uterus, so that she had to be delivered by forceps. The second case followed an uneventful course. Dr. Braithwaite emphasizes the following points in this operation in order to ensure non-interference with expansion and mobility of the uterus during pregnancy. The abdominal incision must be made down to, but not through, the peritoneum, which is opened in the upper part of the wound and the uterus is fixed to the peritoneum belonging to the lower half of the incision by three catgut sutures. The point of attachment must be made as low down on the anterior surface of the uterus as possible, so as to just avoid the bladder. It might be supposed that when the operation was done in this manner the adhesion would not be permanent, but out of about thirty operations in only one did the uterus subsequently become free.

TREATMENT OF FIBROMYOMA.—F. A. Lockhart[2] thinks that a uterine fibroid should not be interfered with unless it is giving rise to serious mental or physical symptoms. Curettement and ligation of the uterine arteries are in many cases merely palliative measures. Removal of the appendages ought to be a *dernier ressort,* as it practically never cures and does not always give relief. The operation should be either total hysterectomy or myomectomy, the latter especially where the tumor is submucous or subserous, with a pedicle or distinct border, or where several small nodules lie immediately beneath the peritoneum. Total hysterectomy is indicated where the tumor is submucous and non-pedunculated and the cervix cannot be dilated sufficiently to allow of morcellement; or where the tumor is either interstitial, large, and subserous, without a pedicle, soft, fibrocystic, or undergoing degeneration, or is complicated by diseased adnexa.

THE REMOTE RESULTS OF CONSERVATIVE OPERATIONS ON THE OVARIES AND TUBES: AN ANALYSIS OF EIGHTY-FIVE CASES.—W. L.

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[1] British Medical Journal, June 16, 1900.
[2] American Gynæcological and Obstetrical Journal, December, 1899.

Burrage said he had performed one hundred and thirty-seven operations on diseased uterine appendages with the object of preserving one ovary or a portion or portions of one or both ovaries with their tubes, or as much of the tubes as was reasonably normal in appearance. In eighty-five of these reliable information as to the present condition could be obtained at least a year after operation, and the results were included in the tables accompanying the paper, the cases being divided into the more severe and the less severe. It was found that gonorrhœa and syphilis were more prevalent, and that the symptoms had resulted more frequently from difficult labors or abortions among the more severe, and that the tubes were closed in a majority of the more severe, whereas they were open in all but one of the less severe. Pregnancy followed operation in four of the more severe and in all of the less severe, but did not occur in the cases in which the closed tubes had been opened and new ostia formed. In all of the cases of subsequent pregnancy in both classes, except two of the less severe, the patients had had previous pregnancies. Anatomical cure was recorded in thirty-three out of fifty-seven cases which came under observation, and symptomatic cure in sixty out of eighty-five cases. Conservative operations are advisable in all cases in which the ovaries and tubes were not hopelessly diseased in all parts of their structure, except on patients who were near the menopause, on patients who had pronounced gonorrhœa of long standing, and on the rare cases of malignant disease. With the present methods of performing resection of the tubes, if both tubes were found closed, subsequent pregnancy was not to be expected. In severe grades of inflammation of the appendages irrespective of causation, if the ostium abdominale of one tube was patent, the prospect of subsequent pregnancy after the preservation of a portion of the ovary was about one in four and a quarter, or 23.5 per cent. In less severe grades of inflammation under similar conditions of tube and ovary, the prospect of subsequent pregnancy was about one in two and a quarter, or forty-four per cent. In women who had borne children, in both classes, subsequent pregnancy might be expected in thirty-five per cent., whereas in previously sterile women it might be looked for in only five per cent.

INTRA-ABDOMINAL AMPUTATION OF THE UTERUS; A MODIFICATION OF HYSTERECTOMY.—F. H. Davenport, of Boston, states that the indications for hysterectomy are pretty well established, and that interest is now centred upon the technique. He calls attention to a modification of so-called abdominal hysterectomy which he has practised for about two years. When it is possible in a young married woman to leave the cervix, he prefers to do so, and chooses the abdominal route.

He operates by the vagina for cancer of either the cervix or body, and for non-adherent, medium-sized fibroids in single patients or those near or past the climacteric who object to the scar. On the other hand, in a young married woman he chooses the abdominal route, it being of importance that the vagina be preserved. If hysterectomy be performed for chronic disease, the abdominal route gives full opportunity for examination of the appendages and other pelvic viscera. The essential feature in which his method differs from that usually employed is that the uterine arteries are not ligated. His results have been satisfactory.

SUTURING THE ROUND LIGAMENTS TO THE VAGINAL WALL FOR RETROVERSIONS AND FLEXIONS OF THE UTERUS.—Hiram N. Vineberg, of New York, deemed it necessary again to describe the technique in detail, as he had found that the method had not been correctly understood. The patient is prepared as she would be for a vaginal hysterectomy. When the uterus is unusually large and heavy, or when the uterorectal ligaments are put in high tension by anteverting the uterus, it is wise, according to his experience, to employ a single uterine fixation suture in addition to the round-ligament sutures. To avoid the possibility of dystocia in the event of pregnancy, this suture should not be placed too high upon the uterine wall. Any operation on the cervix or the posterior vaginal wall and perineum that may be deemed necessary is now done. The patient is kept in bed for twelve days, when the round-ligament sutures can be removed, with the uterine suture if present. Curettage usually precedes the operation. He had performed anterior and posterior colporrhaphy in fourteen cases, and amputation of the cervix in seventeen cases; trachelorrhaphy in six cases; Tait's operation for complete laceration of the perineum in two cases; excision of a vaginal cyst in two cases; salpingo-oöphorectomy in five cases; ovariotomy in two cases; conservative surgery upon the tubes and ovaries in twenty-five cases. Thus, in sixty-four per cent. some surgical work upon the adnexa was found necessary. There was no mortality in the fifty-three consecutive cases. In every instance the peritoneum was opened and the adnexa were visually inspected. Convalescence was uneventful in forty-eight cases; in five there were some complications. In only one case was there absolute failure, the uterus being found in retroversion six weeks after the operation.

PUERPERAL ECLAMPSIA.—Ernesto Pestalozzi[1] makes a distinction between true, concealed, and pseudoeclampsia. The true and the pseudo

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[1] Rivista Critica di Clinica Medica.

are convulsive forms of the auto-intoxication; the concealed form is due to this auto-intoxication, but the convulsions are inhibited by some cause which prevents the cortical substance from acting, such as a cerebral hemorrhage, for instance. In pseudo-eclampsia the auto-intoxication has a secondary *rôle*, the convulsions apparently being due to the stimulus of a cerebral tumor, or a meningitis, for example, upon a nervous system rendered particularly susceptible by pregnancy.

TREATMENT OF RUPTURE OF THE UTERUS BY PACKING THE TEAR WITH IODOFORM GAUZE.—Herbert Spencer reports four cases successfully treated by packing the tear *per vaginam* with iodoform gauze. All other cases, about eight in number, had died from shock and hemorrhage, or in a short time from sepsis. Abdominal hysterectomy was seldom necessary unless the fœtus had passed into the peritoneal cavity. If performed, it should be done rapidly under local infiltration anæsthesia, and the peritoneal cavity flushed with a normal salt solution, the tear being sutured or packed with iodofrom gauze and drained by the vagina or abdomen. When the broad ligaments are involved, vaginal hysterectomy gives the best results. All incomplete tears implicating the broad ligaments and most complete lacerations are best treated by packing with iodoform gauze after removing clots and fluid blood.

PÆDIATRICS.

ENTERIC FEVER IN CHILDHOOD.—A. D. Blackader [1] presented to the American Pediatric Association an analysis of one hundred consecutive cases of enteric fever in children under fifteen years of age; four were infants under two years, the youngest being thirteen months old. Although the disease is regarded as comparatively rare in infancy and is notable for the vague character of its clinical picture, typhoid fever should be suspected in all cases of continued fever of a remittent type at this period of life. The writer believes that instances of this infection will be found more numerous than many authors at present admit. Of the cases reported twenty-three per cent. were of a severe type and ran a prolonged course, while in seventy-seven per cent. the duration of the fever was only three weeks. This is in accord with the general experience that the type of the disease in childhood is less severe than in adult age. In the cases presented, headache was the most prominent initial symptom, occurring in eighty-three per cent.

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[1] Archives of Pediatrics, September, 1900.

of the children over six years of age; anorexia was noted in about fifty per cent. Movements of the bowels looser and more frequent than normal were noted in thirty-six cases; of these ten were distinctly diarrhœal in character, but in only four did the diarrhœa persist and require special medication. Slight fulness of the abdominal parietes was noted in forty-eight cases; epistaxis occurred in twenty-three. During the course of the disease the temperature on several occasions reached 104° F. or over in about fifty per cent of the cases. Rose-spots were observed in fifty-five cases and the spleen was palpable in seventy. In the majority of cases the pulse remained slow, even under the stimulation of the high temperature, indicating possibly some action on the pneumogastric centre by the toxins of the typhoid bacillus; in the more severe cases, however, this action appeared to be more than counteracted by the effect on the muscular wall of the heart, as indicated by the frequent development in children of a soft systolic murmur, heard most frequently in the mitral area but sometimes at both apex and base.

The treatment in the majority of cases consisted in the systematic employment of cool or cold baths, repeated every three hours whenever the temperature rose to about 102.6° F.; in the milder cases, however, systematic spongings were substituted; in a few instances the cold pack was employed; in fourteen cases the treatment was merely symptomatic. Stimulants, either whiskey or brandy, were employed cautiously in most instances, freely in a few, alcohol being regarded not merely as a stimulant but also as a rapidly and easily appropriated food. Strychnine was administered when required as a cardiac stimulant.

The writer emphasizes his belief in the great value of cool or cold baths, not only for their antipyretic action, but also for their tonic influence on the nervous system and through it on the heart, the respiration, and the secretions, especially the secretion from the kidneys. The nervous system of the child, however, responds more quickly and energetically to the cool baths than does that of the adult. Sudden and severe shock is to be avoided. The duration of the baths, their temperature, and the frequency with which they are to be employed should be modified to suit each case, just as we modify the dosage of other therapeutic remedies.

PAVOR DIURNUS IN CHILDREN.—The symptoms of waking- or day-terrors are, according to G. F. Still,[1] fairly constant. A nervous, excitable child, in the midst of play or while sitting quietly, suddenly

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[1] Lancet, February 3, 1900.

and without any apparent cause begins to scream and looks terrified. Sometimes he fancies that he is being pursued or that he hears something which frightens him, or some other form of hallucination or delusion may be present. He rushes screaming to some one for protection, and no coaxing or attempts to soothe can pacify him. In one case, when the attacks occurred, the child was said to have a strange expression about the eyes, which was described as a "vacant look." This child also turned pale, as children very readily do, with fear. In none of the cases was there loss of consciousness, and the children invariably recognized those about them. Dr. J. F. Goodhart states that in these seizures the child sometimes shows a definite dread of certain individuals, of whom at other times it is even inordinately fond, and that he has known a child to be quite maniacal during its fright. The attacks lasted from a few seconds to about a quarter of an hour, and their frequency varied from one in a fortnight to twenty in a day. Although these attacks may be associated with night-terrors, they may also occur without any nocturnal symptoms.

HYDRIATIC MEASURES IN FEBRILE DISORDERS OF INFANCY AND CHILDHOOD.—Simon Baruch [1] states that the superiority of hydriatic measures over drugs in the management of febrile disorders lies in the fact that by their use we may combat and prevent the ever-present danger of heart-failure. The application of cold water to the skin, if judiciously adapted in temperature, duration, and mechanical impact to each individual case, restores the lost tone of the cutaneous vessels, which are capable of holding two-thirds of the entire blood-supply of the body. As a result of their restoration to normal action, there is increased resistance to the blood-current and the cardiac systole is enhanced, as is evidenced by increase of pulse-tension, diminution of pulse-rate, and removal of dicrotism. The object of cold water applications is by their action upon the nerve centres to restore the functional activity of all the organs of the body, and not merely to reduce the temperature. The wet pack, the sheet bath, the wet compress, each has its individual advantage and applicability. The common practice of passing a damp sponge over the hot skin of a fever patient is of questionable value; the true stimulating effect upon the central nervous system and the cutaneous vessels can be elicited only by adding gentle mechanical irritation. In all febrile diseases of children he orders hourly or two-hourly ablutions, beginning with water at 90° F. and reducing the temperature (one degree each time) to 60° F., as an initiatory measure, and maintaining the good effect by a wet

[1] Pediatrics, January 1, 1900.

compress. He disapproves of covering the wet compress with oiled silk, because it converts the cold compress into a warm poultice. In the pneumonic fevers of children he places the child's entire trunk in water at 96° F., using continuous friction over the body and gradually reducing the temperature to 85° F. or 80° F., during five to eight minutes. This bath should be followed by drying and friction, because the pneumonia patient, by reason of the pain, cough, and embarrassed respiration, cannot bear the colder bath. In those desperate conditions of bronchopneumonia in which positive stimulation is needed, when the skin is cyanotic, the respiration shallow, the pulse rapid and almost imperceptible, and the extremities cold, though the internal temperature be high, he orders a stimulant, and from a basin pours water at 60° F. with some force over the shoulders of the child recumbent in a tub of water at 105° F. reaching to the navel. This is followed by drying and friction, and is repeated every hour or two, the number of basins of water being increased gradually to four, after which the entire aspect of the case often changes. This method is also indicated in the early stages of those severe cases of scarlatina and measles in which similar conditions exist without pulmonary complications.

PATHOLOGY AND BACTERIOLOGY.

UREINE.—Ovid Moor announced at the Thirteenth International Medical Congress the discovery of ureine, which he considers to be the principal organic constituent of urine, and the true cause of uræmia. He began his studies with substances which could be easily oxidized, and which gave the characteristic blue reaction with a solution of ferrocyanide of potassium and ferric chloride. It was found that human urine contains a large quantity of some organic substance which gives this blue reaction very intensely, which forced him to the conclusion that none of the organic or inorganic components of urine account for this intense reaction. After prolonged and careful investigation, he discovered, on July 5, 1900, that the human urine contained a liquid organic body in a quantity superior to urea, and which he designated as ureine. That this metabolic product should have escaped the notice of observers for so many years he does not think strange, owing to the firmly rooted idea that urine is a liquid composed of water and inorganic salty ingredients. In isolating this organic constituent high temperature should be avoided and chemicals used as little as possible. The urine to be examined is placed in a large,

shallow, flat receptacle, and evaporated at a temperature of not over 50° C. As soon as vapor ceases to ascend, the remainder of the liquid is treated with a strong solution of silver nitrate until no more precipitate is formed. When cooled sufficiently to promote the separation of the saline and earthy phosphates the liquid is filtered, the filter being washed once or twice with water, until the liquid comes out perfectly colorless. The filtrate is now put into a small but rather deep cup and heated to 65° C., in order to evaporate the remaining water. A new aqueous vapor will be formed, which will soon cease to appear, though evaporation may continue to go on invisibly.

Ureine somewhat resembles olive oil. It is of a pale yellowish color, of a slightly bitter taste, gives to the touch the sensation of a fatty substance, and produces on paper spots which resemble fat spots, though not so marked as those produced by fat. Its specific gravity is about 1270, a little higher than that of glycerin, and it is freely miscible in all proportions in water and alcohol, whether they are of neutral, acid, or alkaline reaction. It is barely soluble in ether. Its reaction is very slightly alkaline, almost neutral. He believes that it belongs to the group of alcohols of the aromatic series, that it gives to urine its specific odor, and that it is the principal cause of the irritating qualities of this excretion. One of the most remarkable characteristics of ureine is its ability to take up large quantities of oxygen with great facility. It is important to remember that this power does not depend only on the quantity of ureine present, but to a greater extent on its quality, on some intrinsic peculiar force inherent in this wonderful organic liquid. He has seen urine which contained less ureine than other samples absorb more oxygen than did the latter, and especially strong was this power of absorption in the urine of a pregnant woman. Ureine surpasses urea as regards quantity, and the greatest amount is contained in urine voided between five and seven o'clock in the afternoon. It was to be expected *a priori* that the principal organic constituent of urine should be the true cause of those toxic symptoms which have been designated collectively by the name of "uræmia," and which are quite frequently incident to the puerperal state. After all the other organic and inorganic components of urine failed to account for this terrible toxic phenomenon, a few experiments on rabbits have fully demonstrated the truth of these *a priori* conclusions. Several of these animals, each weighing over one kilogramme, succumbed from one to three hours after subcutaneous injections of from three and one-half to four and one-half cubic centimetres of ureine. He states that ureine is the principal cause of the ammoniacal fermentation of urine, as without its presence urea cannot be decom-

posed into ammonia and carbon dioxide. Neither Pasteur's *Micrococcus ureæ* nor Leube's *Bacterium ureæ* nor any other micro-organism is able to change urea. In fact, in many respects urea is as indestructible as iron, silver, or any other element, for the strongest mineral acids do not decompose it, but simply combine with it. Only a temperature above 130° C., perhaps 140° C., can split urea into ammonia and carbon dioxide. Ureine is, therefore, a ferment which has a potential energy of at least 130° C.

A number of recent observers who have repeated the work of Moor do not confirm the existence of ureine.

CIRRHOSIS OF THE LIVER.—Examination of sections of cirrhotic livers has led Voelcker to believe that there is a distinct difference between the peripheral and the intercellular forms. He considers that, though in the peripheral forms a slight degree of intercellular sclerosis exists and in the intercellular form a little peripheral sclerosis is met with, there is never any difficulty in determining to which category the chief change should be referred. Different views are held as to whether the primary change was in the liver-cell and the cirrhosis secondary to this, or whether the fibrosis was primary, and the changes in the liver-cells secondary. Voelcker regards cirrhosis as a wide-spread, recurrent, chronic, degenerative process associated with regeneration of the parenchyma. Opposed to this is the view that the changes in the liver-cell are secondary to the changes in the connective tissues, and that there is no relation between the amount of cirrhosis and the degree of degeneration. He suggested that in cirrhosis of the liver the effects of one or more poisons, both in the liver-cells and in the connective tissue, and the occurrence of degenerative and regenerative processes would depend upon the nature of the poison and upon the power possessed by the liver-cell to resist it.

Lazarus-Barlow believes that in hepatic cirrhosis there is first a destruction of the hepatic cells themselves, as a result of the action on them either of alcohol or of some bacterial poison, and that subsequently there occurs an overgrowth of the normal fibrous tissue of the liver to fill up potential lacunæ.

Another feature of the subject is the experimental production of hepatic cirrhosis. That this disease is due to a specific micro-organism has been proved by experiment, to the extent that localized patches of cirrhosis have been produced in certain lower animals by the injection of bacteria or their products, but no widespread increase of the fibrous tissue, such as is seen in hepatic cirrhosis in man, has yet resulted. Professor Ludvig Hektoen has shown that in guinea-pigs the subcutaneous injection of about one cubic centimetre of a bouillon cul-

ture produced, in addition to local changes beneath the skin, increased cirrhosis of the liver, which, however, was not constant.

Theodore Fisher argues that, as some of the acute and subacute inflammations of the kidney are due to septic micro-organisms or their products, an interstitial hepatitis may arise in the same way. It is undoubted that fibrous changes are occasionally produced in the liver by the action of micro-organisms, but there seems to be no proof that the condition generally understood by the term " cirrhosis of the liver" is brought about in this manner.

CANCER.—In reporting the results of their researches on the etiology of cancer, Roswell Park and Gaylord call attention to the frequency of " fragmentation" of cancer tumors, which has been regarded as a post-mortem change. They declare that the mechanism of lymphatic enlargement has not yet been made clear and that the diffusion of cancer along the nerve-trunks is more frequent than is commonly supposed. That immediate contact is not necessary is shown by cancer of the lip and tongue. Cancerous elements when introduced into the serous fluids seem to find very unfavorable conditions for their development. Syphilitic lesions, or their resulting scars, and fistulous tracts, especially those leading inward from the skin, have often been the starting-points of cancer. Scar tissue is particularly liable to undergo cancerous change, especially scars following extensive burns. About the vulva, as well as about the tongue, slight but prolonged irritation or traumatism is a common source of cancer. They recently saw a marked case of multiple sarcoma originating in what had been apparently a nævus. Uterine adenoma certainly predisposes to cancer of the uterus. Park does not believe in the heredity of cancer, although he believes in an hereditary transmission of a soil favorable to the growth of cancer.

Inglis Parsons, in a paper on the treatment of cancer based on the saccharomycetic origin of the disease, thinks that a diabetic diet, to reduce the sugar as much as possible, should be recommended.

A METHOD OF STAINING BLOOD SMEARS.—G. Scott [1] gives the following method of fixing and staining blood films. The wet film is held face down in a wide-mouth bottle containing the vapor from the ordinary forty per cent. formalin solution for about five seconds, and is then placed in absolute alcohol, where it should be left fifteen minutes, although no damage is done if the specimen remains therein for several days. The excess of alcohol is removed, but, before drying occurs, a few drops of the eosinate of methylene blue is added, the

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[1] Journal of Pathology and Bacteriology, December, 1900.

stain taking from one to two minutes to act. Pour off the excess of stain and wash in distilled water. Blot off excess of water, dehydrate very rapidly in absolute alcohol, wash off alcohol several times with xylol, and mount in xylol balsam.

The eosinate of methylene blue may be prepared by mixing one hundred and twenty-five cubic centimetres of a one-half per cent. solution of eosin with one hundred cubic centimetres of a one-half per cent. solution of pure methylene blue in absolute methyl alcohol, or a one-half per cent. estimate of methylene blue solution made with pure methyl alcohol may be employed.

DIPLOCOCCUS OF SCARLET FEVER.—Most of the germs which have been put forth as the microbes of scarlet fever have been described as *Streptococci,* the principal exception being a rod-shaped *Bacillus* found by Edington. There is nothing distinctive about the *Streptococci* ordinarily met with in scarlet fever, and it has been practically impossible to differentiate them from other forms of *Streptococcus.* As far as we are aware, however, no proofs have ever been brought forward that the so-called *Streptococcus scarlatani* is capable of producing scarlet fever. Dr. Class, of Chicago, announces his discovery of a *Diplococcus* in cases of scarlet fever, which, when grown on a special medium, assumes a form like a very large *Gonococcus.* The special medium is earth agar, which is glycerin agar to which has been added five per cent. of black garden earth previously sterilized by discontinuous heat. This form is not constantly met with, but it can always be obtained by successive transplantations on earth agar. The biscuit-shaped appearance is best seen in slightly stained specimens in very old cultures grown under favorable conditions. The microbe has the appearance of an enormous *Coccus* having a slightly interrupted contour, the dividing line between the two portions being very indistinct in the more deeply stained specimens. While the form is very constant when the germ is grown on a special medium, it also forms chains, clusters, and sometimes resembles a *Streptococcus* or a *Staphylococcus* on other media. Its one distinguishing morphological feature appears to be its diplococcus form when grown on earth agar. Dr. Class maintains that this *Diplococcus* is constantly present in scarlet fever, having been found in three hundred successive cases. He says that it can be demonstrated in the blood, throat secretions, and scales of every typical case of scarlet fever; but it is very difficult to demonstrate satisfactorily that it is the cause of the disease, as inoculation of lower animals proves little, owing to the symptoms of the disease lacking sufficient characteristics. The organism is pathological to mice, swine, and guinea-pigs, and the *Diplococcus* can, as a rule, be

recovered from the bodies of the affected animals. The blood of convalescents inhibited, to a certain degree, the growth of cultures, and mice treated with subcutaneous injections of blood serum survived longer after inoculation than other animals. The *Diplococcus* is found not only in cases of undoubted scarlet fever, but also in scarlatinal sore throat and in surgical scarlet fever. The micro-organism will grow in milk, but produces no visible change in it.

Baginsky and Sommerfeld [1] have discovered an organism secured from the throat and blood of patients suffering from scarlet fever similar to that described by Class as the cause of this disease.

OPHTHALMOLOGY.

THE TREATMENT OF TUBERCULOUS IRITIS BY TUBERCULIN.—In a clinical and experimental study of the action of tuberculin, F. Schieck [2] tabulates one hundred and sixteen cases of tuberculosis of the iris, of which thirteen were treated with and one hundred and three without tuberculin. An analysis of these cases shows that, clinically, this specialization of the disease occurs more frequently in youth than in advanced life. It is observed as often in the first as in the second decade. The prognosis is best in the second decade, less favorable beyond this period, and most unfavorable during the first ten years of life. Of the one hundred and three cases treated without tuberculin thirty recovered; in sixty-four the eye was lost through suppuration or other conditions necessitating exenteration or enucleation. This is exclusive of all instances in which the eye was removed for any reason other than urgent symptoms due to the tuberculous process alone. In nineteen cases the tuberculous lesions were removed by iridectomy. The results of this operation were successful in eight cases, negative in four, and in seven rapid dissemination and generalization of the disease ensued. Of the thirteen cases treated with injections of tuberculin or tuberculin TR, all, even the most severe forms, recovered. Not a single eye was lost,—*i.e.*, none had to be enucleated. In every case but one not only was the form of the eye preserved, but more or less vision also. Neither the retention of the affected eye nor the employment of the injections appears to have had a deleterious effect upon the general condition of the patient. The apprehension of some, that Koch's method might cause general infection by permitting escape

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[1] Berliner klinische Wochenschrift, July 2, 1900.
[2] Graefe's Archiv, vol. l., No. 2.

of the bacilli from the local process in the iris, seems, therefore, to be wholly without foundation.

The experiments made with tuberculous iritis artificially produced in rabbits show that (1) Tuberculin TR possesses no immunizing power. (2) It is impossible to cure every case of experimental tuberculous iritis or keratitis with TR in the rabbit. (3) Tuberculosis treated with TR does not run a more malignant course than when not so treated. (4) The study of the action of tuberculin in the rabbit's eye cannot be altogether exact, since without tuberculin complete recovery may take place, especially in those cases in which occlusion and seclusion of the iris have caused disturbance in the nutrition of the anterior segment of the eyeball.

That the results of the study of the action of tuberculin upon tuberculosis of the iris in man should be as positive as brilliant while those obtained from experiments upon animals are so unreliable seems at first paradoxical. The explanation, however, is simple. The process known as tuberculosis of the iris in man is an endogenous inflammation, usually insidious in its development, and characterized by the presence within the stroma of the iris of papules of variable size containing but few bacilli. Experimental tuberculosis of the iris, on the other hand, is produced by masses of bacilli deposited not in the tissue of the iris, but upon its surface or in wounds artificially produced upon it. Tuberculin, as is generally conceded, does not destroy the bacilli outright, but, by exciting reaction in the tissues surrounding the tubercles at the point of their deposit, causes an exudation into the neoplasm that subsequently becomes converted into cicatricial tissue. The remedy can, therefore, have little effect upon large numbers of bacilli primarily situated upon the surface of the iris and in many cases surrounded by tissues rich in cells but deficient in connective tissue and with but partial disintegration of the zoogloea masses. The situation of the human tubercle in the iris, a membrane abundantly supplied with connective tissue, and its deficiency in bacilli offer the most favorable conditions for the specific action of the tuberculin.

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